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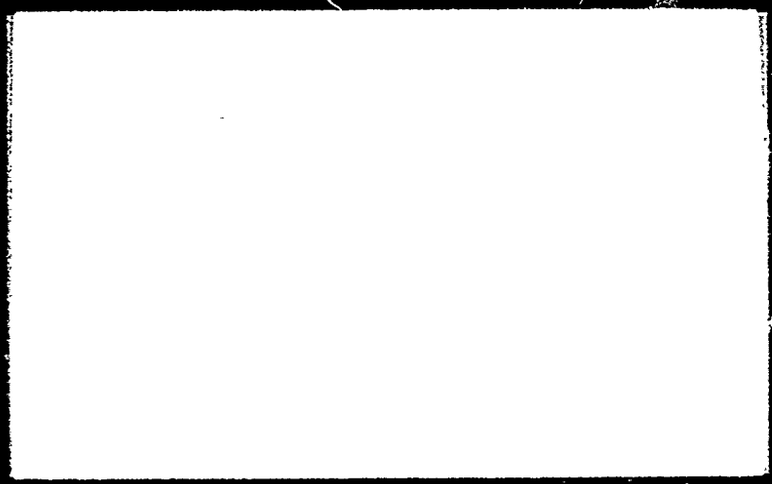
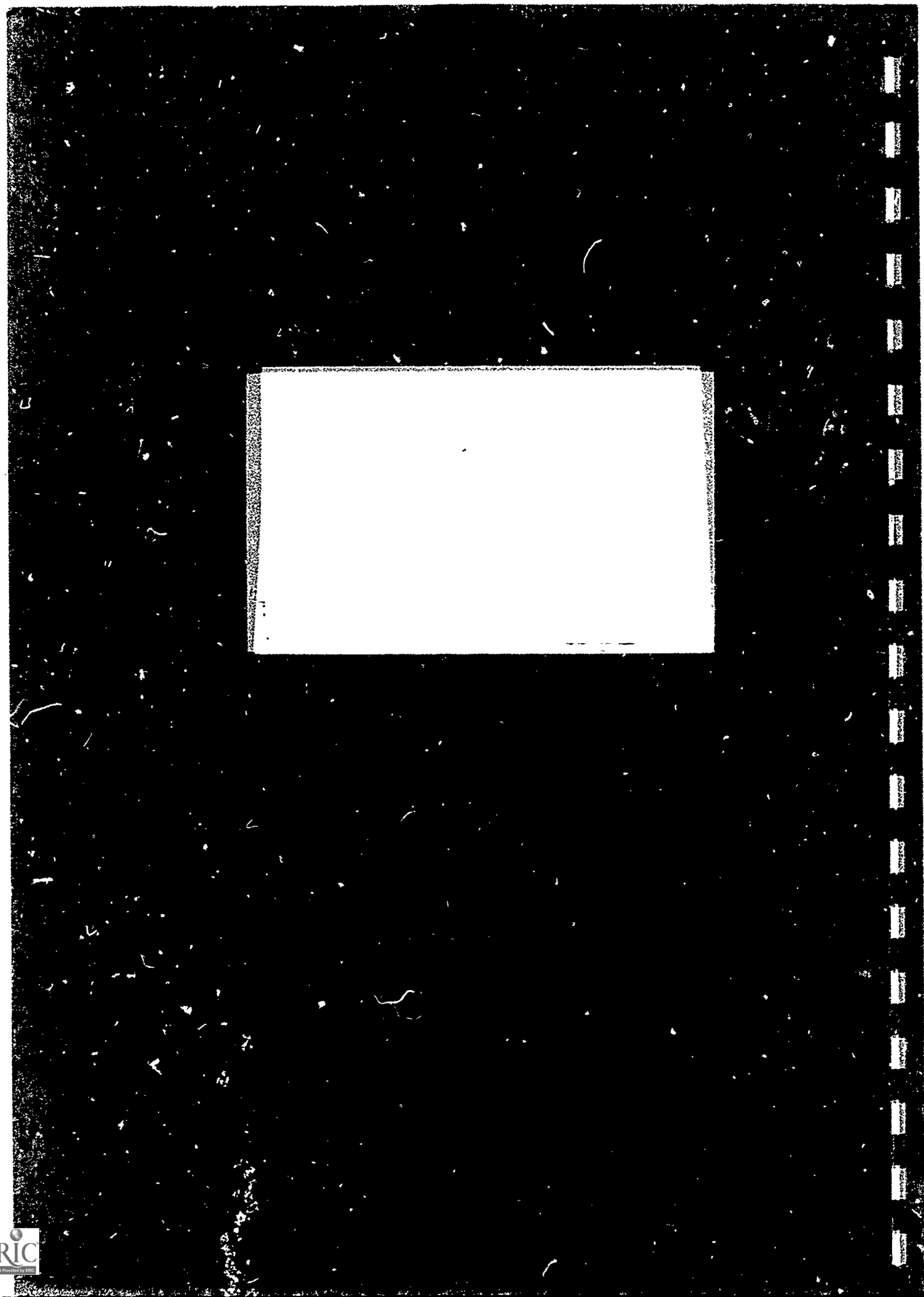
ABSTRACT

This exploratory study, primarily an information collection and analysis effort, was made to determine whether there is a difference in the effectiveness and the cost of cooperative vocational education programs and of vocational programs without a cooperative component. Study data from 12 school districts in three States (Minnesota, North Carolina, and Ohio) for the 1969-70 and 1970-71 school years were used to explore the feasibility of conducting such a cost-effectiveness analysis. It was found that it is possible to analyze historical cost and effectiveness data on selected vocational education programs but that it is not possible to directly compare cooperative programs to those without a cooperative component, as it is unlikely that similar programs are offered using both methods. However, cost-effectiveness analyses may be used as one element in policy formulation concerning vocational education methodologies. Detailed information collected and interpreted in the study are provided, leading to the overall conclusion that there is no obvious difference in the cost of providing either type of program nor are there any obvious differences between graduates of the two types of programs. A very limited employer survey indicated that employers tend to favor graduates of the cooperative programs. Recommendations for further in-depth studies are presented. (MF)





FINAL REPORT

on

COST EFFECTIVENESS OF SELECTED COOPERATIVE VOCATIONAL EDUCATION PROGRAMS AS COMPARED WITH VOCATIONAL PROGRAMS WITHOUT A COOPERATIVE COMPONENT

to

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
U.S. OFFICE OF EDUCATION

June 29, 1973

Prepared Under Contract Number OEC-0-70-4888(358)

by

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- Minnesota

  Mr. Rodney Hale
  South Washington County Schools

  Mr. Anthony Stauber
  Duluth Public Schools

  Mr. David Haugan
  Worthington Public Schools

  Mr. Ronald Haar
  Shakopee Public Schools

- North Carolina

  Mr. Bruce Whitely
  Caldwell County Board of Education

  Ms. Dorothy Boone
  Charlotte-Mecklenburg Board of Education

  Mr. T. C. Knight
  Assistant Principal
  John Motley Morehead Senior High School
  Eden City Public Schools

  Mr. Robert R. Crookshank
  Winston-Salem/Forsyth County Schools

- Ohio

  Mr. Frank Benny
  Director of Personnel and Secondary Education
  Lancaster City School District

  Mr. Joseph A. Lesak
  Mentor Public Schools

  Mr. Charles Besse
  South-Western City School District

  Mr. Steve Zvosec
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There were other members of the central office staff of each district who helped coordinate the data collection efforts for the study. We want to thank them. In addition, there were teachers, teacher-coordinators, and other district staff who helped us.

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- Minnesota

  Dr. Robert P. Van Tries
  Assistant Commissioner
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  Ms. Joleen Durken
  Secondary Vocational Education Coordinator

- North Carolina

  Dr. Charles Law
  Director of Occupational Education

  Mr. Cliff Belsher
  Assistant Director of Occupational Education

- Ohio

  Dr. Byrl R. Shoemaker
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  Assistant Director
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Mr. Robert D. Balthaser
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Mr. Charles Besse
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Mr. Gerrit H. Wiegerink
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EXECUTIVE SUMMARY

COST EFFECTIVENESS OF SELECTED COOPERATIVE VOCATIONAL EDUCATION PROGRAMS AS COMPARED WITH VOCATIONAL PROGRAMS WITHOUT A COOPERATIVE COMPONENT

INTRODUCTION

Public vocational education programs, as directed toward the goal of producing skilled workers, have employed a variety of methodologies for this purpose. One of the most basic distinctions that can be made in these methodologies concerns "in-school" versus "out-of-school" learning experiences. Thus, some vocational education programs have developed "cooperative" work experiences with business and industry to help in providing job skills. The essence of this idea is to provide actual on-the-job working experiences as a part of the educational program.

The research question considered in this study is whether or not there is a difference in the effectiveness and the cost of vocational programs with a cooperative component (co-op method) versus those without a cooperative component (non-co-op method). Thus, the basic analysis procedure needed to answer the research question is a cost-effectiveness comparison of these two types of vocational education.

This research study is directed toward a preliminary determination of the cost-effectiveness of selected cooperative-vocational education programs and the cost-effectiveness of selected vocational programs that do not have a cooperative component.

PURPOSE AND SCOPE OF THE STUDY

The stated purposes of this exploratory study are:

- To identify and describe the various types of cooperative and non-cooperative vocational programs currently being conducted
- To obtain cost comparisons between vocational programs utilizing the cooperative method and regular vocational programs

- To assess the effectiveness of various types of vocational programs
- To obtain data on the type of students in various vocational programs, together with student performance in these programs
- To determine the present status of data availability for making successive in-depth analyses.

This is an exploratory study intended to gain basic information of program direction in some selected locations, to analyze the areas of program strength, and to identify needs for more information as a foundation for policy formulation.

To satisfy the objectives of this exploratory study data from 12 school districts in the U.S. were collected, analyzed and interpreted. The school districts surveyed are:

- Minnesota
  - -- South Washington Public Schools
  - --- Duluth Public Schools
  - -- Worthington Public Schools
  - -- Shakopee Public Schools
- North Carolina
  - -- Caldwell County School District
  - -- Charlotte-Mecklenburg School District
  - -- Eden School District
  - -- Winston-Salem Forsyth County School District
- Ohio
  - -- Lancaster City School District
  - -- Mentor Exempted Village School District
  - -- South-Western City School District
  - -- Lorain City School District.

The study included vocational programs at the secondary level. The following definitions were used throughout the study.

- Vocational education is defined for the purposes of this study to include only high school programs--usually the junior and/or senior years. A vocational program is intensive occupational preparation for a specific occupational objective, or a cluster of occupations and should not be confused with industrial arts programs which are more exploratory in nature.

- Co-op vocational education is defined to include the following characteristics.
  - The co-op student is involved in a productive employment situation directly related to his vocational objective.
  - There is a training plan for each co-op student.
  - There is at least one period of in-school instruction directly related to the student's vocational objective.
  - There is available a school-employed coordinator with adequate time for on-the-job supervision of the co-op student.
- Non-co-op vocational education programs are those that provide vocational training totally within the school environment.

Data were collected, analyzed, and interpreted on the following programs:

Co-op

- Distributive Education, Co-op
- Diversified Cooperative Training
- Cooperative Office Education
- Trade and Industry, Co-op
- Cooperative Work Experience

Non-co-op

- Auto Mechanics
- Auto Body
- Electronics/Electricity
- Drafting
- Machine Trades
- Special Office Training
- General Office
- Stenographic
- Welding.

RESEARCH PROCEDURE

This exploratory study is primarily an information collection and analysis effort. A set of special purpose instruments were developed to collect historical information on cost, effectiveness, descriptions of programs, and characteristics of students. The major tasks were to:

- Select a set of co-op and non-co-op vocational programs to study and select a sample of 12 school districts from which to collect information on the selected programs
- Develop and design a set of instruments for collecting historical information on cost, effectiveness and descriptive characteristics of programs, and types of students in the programs
- Develop a procedure for analysis and interpretation of the data collected information
- Conduct a field study to collect the pertinent information
- Analyze and interpret the information collected in order to meet the objectives of the study.

The field study was conducted in September and October of 1972. The data were collected for the 1969-70 and 1970-71 school years. The study included a brief survey of a small sample of employers in each community. This was an exploratory attempt to determine employers' attitudes about employees who had had co-op vocational training versus those who had had non-co-op training. All the other analyses are based on historical, school-provided data.

SUMMARY AND CONCLUSIONS

The goal of this study was to explore the feasibility of conducting a cost-effectiveness analysis of selected cooperative vocational education programs as compared with vocational programs without a cooperative component. The answer to the question of feasibility must be stated in three parts.

(1) It is possible to collect and analyze historical cost and effectiveness information on selected vocational education programs.

(2) In general, it is not possible to compare directly cooperative programs with those without a cooperative component, since it is unlikely that similar programs are offered using both of the methods.

(3) Cost-effectiveness analysis can be used as one element in policy formulation concerning vocational education methodologies.

This study has shown that school districts can provide information needed to perform cost-effectiveness analyses and that useful information can be displayed to help in policy formulation. However, it is not readily feasible to make a direct comparison of the two methods--co-op versus non-co-op vocational education--within a given program area. Of course, an experiment could be designed to make this direct comparison by either locating those school districts that have used both methods for a given program area, or establishing pilot programs to study the differences.

From the literature, we note that educational leaders advocate work experience as a valuable part of the learning experience. To our knowledge, there have not been extensive studies to examine the worth of work experience as an integrated part of the educational programming. The following conclusions shed some light on this question. The conclusions are presented relative to the objectives of the study. Each of the following section titles is a statement of one of the study objectives.

Cost Comparisons Between Vocational Programs Utilizing the Cooperative Method and Regular Vocational Programs

Based on the cost data collected, we used two cost measures for analysis purposes--annual cost per student and annual cost per student hour. The annual cost per student measure shows a differential of about $190, favoring co-op programs. This differential is a marginal statistically significant difference. On the basis of cost per student hour, there is a differential of about $8, favoring non-co-op programs.

This difference is not statistically significant. There is wide variation in both measures across programs and across schools, but these variations can be explained very well as being a function of the student-teacher ratio. That is, the cost of a program is not a function of the program, nor the method, but the efficiency with which human resources (teachers) are used.

Thus, our overall conclusion, based on this initial study, is that there is no obvious difference in the cost of providing either cooperative vocational education programs or those without a cooperative component.

Effectiveness Comparisons of Various Types of Vocational Programs

The effectiveness comparisons are based mostly on standard follow-up information provided by the schools on graduates of the vocational programs. In addition, a brief survey of employers was conducted to obtain some attitudes from employers regarding graduates of co-op versus non-co-op programs.

On the basis of school-provided information, we note differences between co-op and non-co-op program graduates as follows.

- Graduates of co-op programs enter the labor market with a lower entry wage rate that increases more rapidly, but graduates of non-co-op programs still earn a higher rate after a follow-up period of 13 to 18 months. It must be remembered that this is probably due more to the occupational area itself and the labor market conditions than to the educational experiences.
- The graduates of non-co-op programs remain with their longest full-time employer slightly longer (one month) than do the graduates of co-op programs; based upon a 13 to 18 month follow-up period. This difference is significant in a statistical sense, but not in a practical sense.
- Graduates of co-op programs tend to find full-time employment slightly faster than their non-co-op counterparts, but the difference is only 1.5 weeks--not a very practical difference.

There was no significant difference between the graduates of co-op programs versus non-co-op programs on the basis of the following measures:

- Those students who successfully graduate
- Unemployment rates
- Those entering the local labor market versus those leaving the local community
- Those graduates who entered formal apprenticeship programs
- Employment stability as measured by the number of different employers after graduation.

Our overall conclusion based on the follow-up measures provided by the schools is that there is no obvious difference (in a practical sense) between graduates of co-op vocational programs and graduates of non-co-op programs.

The employer survey very definitely showed a difference. The sample of employers favored graduates of co-op programs (58.6 percent) over those of non-co-op programs (4.2 percent), with 36.6 percent indicating no difference, and 0.6 percent missing data. We must recognize that this sample was small (90 out of 200 employers returned the questionnaire) and that there were some inherent biases that we were unable to control.

Our overall conclusions based on the employer survey are that employers tend to favor graduates of co-op programs and that the process of measuring effectiveness through a questioning of employers results in a much more clear-cut differential between the two methods than does the follow-up information normally collected by school systems.

Identification and Description of the Various Types of Co-op and Non-co-op Vocational Programs Currently Being Conducted

This exploratory study did not allow for an analysis of all of the possible vocational program offerings that exist across the nation. We had to limit the study to those programs that were most common and most apt to be offered in the limited geographical region that was used.

For those programs that were included, we have described them mostly in quantitative terms. The aggregated descriptions for the two types of programs--co-op and non-co-op--show the following.

- The average age of vocational programs was 9 years with no significant difference between co-op and non-co-op programs.
- The average class size for co-op programs was higher than for non-co-op programs, e.g., in the senior year the average was 24.7 for co-op programs and 19.3 for non-co-op programs.
- A greater proportion of co-op programs had occupational advisory committees (71.8 percent for co-op, 61.4 percent for non-co-op), but the proportion is high for both types of programs. The characteristics of the advisory committees did not differ for the two types of programs; however, the committees for non-co-op programs seemed to be more actively involved than those for co-op programs.
- Both types of programs had prerequisite and admissions criteria. Seventy-five percent of the co-op programs used past-attendance records as an admission criterion, while only twenty-five percent of the non-co-op programs included this as an admission criterion. The criterion for co-op programs was more stringent--an average maximum of 21 days absent for the preceding year versus 32 days for non-co-op programs.
- The total number of hours per week spent in instruction was not different for the two types of programs; however, the amount of time spent in in-school vocational training, i.e., both in laboratories and vocationally related instruction, was two to three times greater for non-co-op programs than for co-op programs. The on-the-job training time for co-op students is not included in this comparison.

It is important to keep in mind that the occupational areas for the individual programs is different for the two types of program. Thus, some of the descriptive information is probably much more a function of the type of occupational training provided and not the method that is used.

There are some descriptors relating to enrollment at the school level that add to the descriptions of the programs. The following summarizes these enrollment characteristics.

- For enrollment in the junior year, fourteen schools had a majority of students enrolled as nonvocational, five schools had a majority of students enrolled as non-co-op vocational, and one school did not report these data.
- For senior-year enrollment, twelve schools had a majority of students enrolled as nonvocational, seven had a majority of students enrolled as non-co-op vocational, and one school did not report these data.
- The junior year dropout rate was 9 percent for nonvocational, 8 percent for co-op vocational, and 5 percent for non-co-op vocational.
- The senior year dropout rate was 9 percent for nonvocational, 4 percent for co-op vocational, and 8 percent for non-co-op vocational.

Two descriptors pertain only to the co-op programs:

- There appeared to be little difficulty in finding employment for on-the-job training in the co-op programs.
- A substantial percentage of co-op graduates (46 percent) were able to continue full-time employment with their co-op employer.

These two descriptors tell something about how well the co-op programs fulfill some of their intended purposes, and thus could be considered to be measures of effectiveness. These are included as descriptors because of the uncertainty involved in relating these descriptors to longitudinal effects, and because there are no corresponding measures for the non-co-op programs.

Data on the Type of Students in Various Vocational Programs

The main aggregated results on characteristics of students are as follows.

- The average distribution of race for all twenty schools was 93.5 percent White, or Caucasian; 6.0 percent Black, Afro American, or Negro; 0.2 percent American Indian; 0.2 percent Mexican American, or Chicano; and 0.1 percent Oriental, or Asian American.

- On the average, co-op programs handled proportionately more disadvantaged students than non-co-op programs in the junior year, but the proportions in the senior year were not substantially different.
- The percentage of handicapped students was low in all programs (ranging from 0.4 percent to 0.8 percent) with no substantial difference by type of program.
- Substantially more graduates of co-op programs were female, while more graduates of non-co-op programs were male. This is due to the occupations included in the sample of co-op and non-co-op programs.
- The proportion of graduates who were non-white was greater for co-op programs than for non-co-op programs.

These descriptors might show some of the effects that federal legislation has had on the types of students enrolled in various types of vocational programs. We cannot judge the direct effects that the legislation has had, but a further in-depth study, using some of these descriptors, could lead to more concrete indications of what has happened due to the Vocational Education Act of 1963 and the 1968 Amendments.

Determination of the Present Status of Data Availability for Making Successive In-Depth Analyses

This study shows that it is indeed possible to collect some of the information required for making cost-effectiveness analyses of vocational education programs both with and without cooperative components. The data can be collected at the school district level in the approximate form that we were able to collect it on this study. At this point we cannot be sure whether some of the information could be collected at the state level.

RECOMMENDATIONS FOR FURTHER IN-DEPTH STUDIES

We recommend that further in-depth studies be conducted to answer questions concerning the cost-effectiveness of co-op vocational education versus non-co-op vocational education. We think that it is important to learn more about the costs and effectiveness of these two methods, but that the questions should be expanded in scope. It seems to us that a very important question concerns the worth, or value, or benefit of using work experience as part of the learning experience. This is a much broader question that needs to be asked. This exploratory study considered only questions about co-op versus non-co-op vocational education, and the definition of co-op programs was very stringent. We recommend that the scope of any further studies be broadened to include evaluations of Occupational Work Experience programs and any other programs that use on-the-job training as part of the educational method.

Briefly, our recommendations are:

- That an in-depth study of vocational education programs with cooperative components versus those without cooperative components can and should be conducted
- That the study be directed at the question of what is the efficacy of work experience as an element of the learning experience
- That this exploratory study be used as a model for the in-depth study
- That the effectiveness analysis be expanded to include an in-depth survey of employers and employees and to include an analysis of labor market conditions
- That the in-depth studies be based on a nationwide sample of school districts and include the full gamut of vocational programs
- That some <u>in-depth</u> studies be conducted in <u>selected</u> vocational program areas both with and without cooperative components, if it is impractical to include the full gamut of vocational programs.

We think that this study has set the stage for the more extensive national status study needed as a foundation for policy formulation in the area of career education.

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COST EFFECTIVENESS OF SELECTED COOPERATIVE VOCATIONAL EDUCATION PROGRAMS AS COMPARED WITH VOCATIONAL PROGRAMS WITHOUT A COOPERATIVE COMPONENT

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INTRODUCTION

Public vocational education programs, as directed toward the goal of producing skilled workers, have employed a variety of methodologies for this purpose. One of the most basic distinctions that can be made in these methodologies concerns "in-school" versus "out-of-school" learning experiences. Thus, some vocational education programs have developed "cooperative" work experiences with business and industry to help in providing job skills. The essence of this idea is to provide actual on-the-job working experiences as a part of the educational program. Seemingly, vocational education programs with a cooperative component should meet the goal of producing skilled workers to a greater degree than vocational education programs that do not have a cooperative component, for two principal reasons. First, for many occupations, it is difficult to conceive that students can receive training solely through classroom and shop courses that is equivalent to the training received by students who have on-the-job experiences as part of their program. Second, the real-life experience has been one criterion used by employers in hiring new employees.

Nevertheless, there are difficulties with both of the positive aspects of cooperative vocational education mentioned above. Unless the school system provides teacher-coordinators who are truly involved in the work experiences, the job tasks given to the students might not be sufficiently relevant to the educational objectives (e.g., there may be no planned progression in assigned job tasks).

Due to the pressures of conducting business, employers might not have the time, patience, or instructional experience to help the cooperative students in a meaningful way. Thus, there is a question as to whether vocational programs with a cooperative component are any better than those without a cooperative component, i.e., whether all the available instructional time might be better spent in "in-school" learning experiences.

The research question to be answered is whether or not there is a difference in the effectiveness and the cost of vocational programs with a cooperative component versus those without a cooperative component. Thus, the basic analysis procedure needed to answer the research question is a cost-effectiveness comparison of the two types of vocational education.

This research study is directed toward a preliminary determination of the cost-effectiveness of <u>selected</u> cooperative-vocational education programs and the cost-effectiveness of <u>selected</u> vocational programs that do not have a cooperative component.

BACKGROUND

In the spring of 1970, the Department of Health, Education, and Welfare, U.S. Office of Education, issued a Request for Proposals (RFP-70-14) containing nineteen tasks, each to be a separate research study. Task 4 in that RFP was entitled, "Cost Effectiveness of Selected Cooperative Vocational Education Programs as Compared with Vocational Programs without a Cooperative Component". The Columbus Laboratories of Battelle Memorial Institute responded to that RFP

by submitting research proposals for several of the tasks, including Task 4. Battelle-Columbus was awarded a Fixed-Price Contract to conduct a study as outlined in the Work Statement and interpreted in Battelle-Columbus' proposal for Task 4--Cost Effectiveness of Selected Cooperative Vocational Programs as Compared with Vocational Programs without a Cooperative Component. The initial period of the contract was from June 24, 1970, through May 25, 1971.

There were several delays in the progress of the study, necessitating several contract modifications. These delays resulted in the study period being extended to April 30, 1973. The primary reasons for the extensive delays were procedural difficulties in obtaining clearance actions for the data collection instruments that were designed for the field work tasks of the study. The Federal Reports Act requires that the Office of Management and Budget (OMB) review and approve any instruments developed on a study sponsored by a Federal agency that will be used to collect information from ten or more persons. This act requires the agency that initiates the study to submit a Supporting Statement that includes:

- Justification of the form or procedure
- Justification of the method used in selecting and contacting those to be covered
- A brief description of the plans for collection, tabulation, and publication
- A documentation of consultation with those supplying data, users of data, and others
- The estimated cost to the Federal Government
- A finalized version of the instruments, instructions, letters of transmittal, etc.

These items are to be submitted to the OMB as a "Request for and Notice of Office of Management and Budget Clearance Action". The OMB approves the instruments and issues a number and expiration date that must be clearly printed on the data collection instruments.

In the case of this study the instruments had to be approved by the National Center for Educational Statistics (NCES) prior to being submitted to the OMB. (This requirement was made known to

Battelle-Columbus after the study had been initiated.) The review by the NCES took many months and resulted in numerous revisions and resubmittals of the Request for Clearance. The original request was submitted on October 16, 1970. The last revision of the request was submitted on February 8, 1972; early in March, 1972, the NCES approved the instruments; on April 12, 1972, the OMB approved the instruments. The data collection was begun in mid-September, 1972, since the field work was to be conducted in local school districts and the appropriate personnel are not available during the summer months.

In spite of the extensive delays, the continuity of the study did not suffer. The pertinent personnel at Battelle-Columbus and the U.S. Office of Education maintained a good working relationship, and the study proceeded according to the original intent.

PURPOSE AND SCOPE OF THE STUDY

The stated purposes of this exploratory study are:

- To identify and describe the various types of cooperative and non-cooperative vocational programs currently being conducted
- To obtain cost comparisons between vocational programs utilizing the cooperative method and regular vocational programs
- To assess the effectiveness of various types of vocational programs
- To obtain data on the type of students in various vocational programs, together with student performance in these programs.

An ancillary purpose is to determine the present status of data availability for making successive in-depth analyses.

This is an <u>exploratory</u> study intended to gain basic information of program direction in some selected locations, to analyze the areas of program strength, and to identify needs for more information as a foundation for policy formulation.

Quoted directly from the RFP, the scope of the study is defined as follows:

> "Because of the diversity and dispersion of programs, it will be necessary to place some constraints on the initial study.
>
> The study will survey programs at the secondary level in approximately 12 school districts or areas including cooperative programs and other programs in the same vocational areas not using the cooperative methodology."

The first paragraph indicates that this is to be an initial study; the second paragraph indicates that just 12 school districts are to be surveyed. The scope as defined in the RFP is very limited, a fact that emphasizes the exploratory nature of this project. The background section of the RFP included the following statement:

> "This is a limited objective study on a case study basis due to financial limitations. It is recognized that a national status study is needed, but this is a 'first step' in the investigation of the cooperative method of instruction."

Once again, reference is made to the exploratory nature of the study.

One of the purposes of this exploratory study is to determine the present status of data availability needed to make an evaluation of the cooperative method of vocational education. The RFP states:

> "It is anticipated that a great deal of this information will be gathered through interviews with vocational administrators at the State and local level, with the cooperative program coordinators, and from appropriate records. It will be also necessary to utilize to the fullest extent data available in the State or local systems."

This indicates that the main thrust of the study is to gain as much cost and effectiveness information as possible from information already available in the State or local system. This study is intended to be an initial step in determining the requirements for an in-depth analysis of vocational education with a cooperative component (co-op method) versus vocational education without a cooperative component (non-co-op method).

RECENT VIEWS ON VOCATIONAL EDUCATION AND COST-EFFECTIVENESS ANALYSIS

This section is based on a partial review of the most recent literature on the general subjects of vocational education and cost-effectiveness analysis. The purpose of this section is to present those activities, thoughts, and opinions that seem to represent the current published views in these two subject areas. In addition, we have interjected our own views based on the experiences of the Battelle staff and the consultants who helped on the study.

Vocational Education

Legislation Providing Program Funding

Two pieces of legislation provide the basis for activities in vocational education today--The Vocational Education Act of 1963*, and the Vocational Education Amendments of 1968**. The Act of 1963 was spurred by high and persistent levels of youth unemployment and high rates of school dropouts. The Amendments of 1968 stressed services to disadvantaged (rural and urban) and handicapped youth. It also authorized both school and work programs.

Vocational and Career Education

It is important to note that great impetus was given to vocational education in the early 1960's, and now the emphasis is becoming very broad via the concept of "career education". Through this concept, a child's education is viewed from its very beginnings throughout his entire developmental stages and into adulthood. In effect,

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* Vocational Education Act of 1963, Public Law 88-210, December 18, 1963.

** Vocational Education Amendments of 1968, Public Law 90-576, October 16, 1968.

career education encompasses all the educational experiences of an individual, regardless of whether those experiences follow into a trade, a college-based profession, a homemaker, or whatever life path that is followed to enjoy a useful, happy life in this culture.

Historically, we have progressed to this point over about the last decade, briefly as follows.

- The Vocational Education Act of 1963 gave great impetus to vocational education. Funding was delayed until 1965 because of the priority given to the Manpower Development and Training Act.
- Vocational programs expanded due to funding from Federal and state sources that provided facilities, equipment and staff.
- Special needs were identified for disadvantaged and handicapped youth and programs were established in rural and depressed areas.
- The 1968 Amendments stressed special needs programs with emphasis on economically, socially, and culturally disadvantaged youth.
- Current trends in career education are for work preparation, skill training, multiple careers, career exploration and orientation, mid-career renewal (adults), and crisis and change in employment.
- Programs are being expanded into career development in the formal educational system (kindergarten through 12th grades), vocational exploration and orientation, and work-study programs (including cooperative vocational education) for disadvantaged students and potential dropouts. At the present these are mostly pilot and demonstration projects, and they are a departure from the traditional 11th and 12th grade occupational skill development.

Thus we see that vocational education has blossomed in the last decade. It is no longer viewed as a supplementary set of programs that are subordinate in status to the academic curricula. Career education is for everybody and everybody has a right to this kind of development.

Recommendations from Leaders in Vocational Education

Grant Venn* makes several very important observations concerning the work experience aspects of education.

- It is highly desirable for all students in high school to have some work experience that provides orientation, exploration, and acquisition of skills.
- There is a need for schools to establish working relationships with business, industry, and general employers in the community.
- Career-oriented education has work as a basis for education.

He recommends that work experience be integrated as a part of the methodology for education and should be required of all students. Further, he recommends that cooperative education be expanded as a major learning method in occupational preparation, and that there should be a high degree of cooperation between the school and the community with all programs coordinated under one authority. Obviously, he is pushing for work experience and vocational programs with cooperative components.

Saul Lavinsky** advocates strongly the concept of cooperative vocational education. He makes the following points.

- The Manpower Report to The President (1972) recommends sharply increased support for cooperative vocational education. (This is evidenced by the 1968 Amendments to the Vocational Education Act of 1963.)
- The advantages of cooperative programs are recognized but national enrollment in such programs was less than 300,000 in 1970.
- The concept of cooperative programs must be sold to prospective employers.
- The slow growth in cooperative programs is caused in part by the requirements for special, time-consuming attention that must be given each student by the teacher-coordinator.

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* Venn, Grant, Man, Education and Work, American Association of School Administrators, Washington, D.C., 1970.

** Lavinsky, Saul, "Improving Human Learning", American Vocational Association Journal, May, 1972, pp 57-58.

Lavinsky recommends increasing the funding by the U.S. Office of Education to help in the expansion of cooperative programs.

Bikkie, Eggland, and Zikmund* point out the needs associated with the role of the teacher-coordinator in cooperative programs.

- Teacher-coordinators are a vital aspect of cooperative vocational education.
- The lack of systematic training and education of teacher-coordinators results in poorly supervised programs.
- There is a need for university-based training and education of teacher-coordinators.
- Some methods for training teacher-coordinators are short, intensive workshops (out service) or in-service on-the-job training.

The authors recognize that the teacher-coordinators and the functions they perform are the heart of a cooperative program. By strengthening the teacher-coordinator, the cooperative program is correspondingly strengthened.

Eli Ginzberg** wants to see a more integrated approach to career education.

- There is a need for work experience (expansion of work-study and cooperative work experience) along with career education.
- Schools should provide job placement services and follow-up into initial employment.
- Guidance counselors should coordinate community resources and prepare youth for transition from school to work.
- There is a need for more cooperation between various educational sectors such as general, vocational, industrial arts, and guidance.
- There is a need for better labor-market and occupational information from the local, state, and Federal governments (U.S. Department of Labor).

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* Bikkie, J.A., Eggland, S.A., and Zikmund, D.E , "An Instructional System to Prepare Teachers and Coordinators for Cooperative Educational Programs", American Vocational Association Journal, January, 1972, pp 36-72.

** Ginzberg, Eli, Career Guidance: Who Needs It, Who Provides It, Who Can Improve It?, McGraw Hill, New York, 1971.

These leaders in vocational education are all emphasizing the need and worth of work experience in some form in educational programming. We did not purposely refer to leaders who have taken this viewpoint, and we are neither supporting, nor refuting this viewpoint. The fact is that many educational leaders see definite advantages to integrating work experience with the academic learning experience.

Some Recent Studies on Vocational Education

This section presents a capsule view of other recent studies that are relevant to this study. Each study is presented in outline form in order to highlight the most important characteristics and results of the study.

A. Sanders, Lester E., A Comparison of Two Methods of Preparing Youth for Employment: Cooperative Occupational Education Versus The Preparatory Vocational-Technical School, (dissertation), Missouri State Department of Education, Jefferson City, 1967.

- This was a study and analysis of 268 graduates of cooperative occupational education compared with 417 graduates of vocational-technical education for years 1961-65. The study included surveys of students, parents, and employers.
- The major findings of the study were:
  - (1) The cooperative programs provided greater impact in maintaining interest of students toward school.
  - (2) The transition to full-time work and employment was quicker and easier for students in cooperative programs.
  - (3) The majority of students took advantage of unsupervised work experience.
  - (4) After a period of adjustment, more students in co-op programs tended to return to the occupation for which they were trained.
  - (5) Co-op students tended to demonstrate more desirable personality traits, work habits, and a high degree of occupational competence.

B. University of Minnesota, Notes and Working Papers from The National Conference on Cooperative Vocational Education: Implications of the 1968 Amendments, February, 1969.

- This was a conference of 200 representatives of business and industry, labor, government, education, and community leaders.
- The major conclusions of the conference were:
  (1) There is a need to clarify definitions of programs.
  (2) There is a need to identify student qualifications with priorities to the disadvantaged and potential dropout.
  (3) There should be an earmarking and expansion of funding authorization with more exemplary program studies.
  (4) The various program funding sources need to be coordinated.
  (5) The value of programs often is based upon assumptions without adequate tailoring to meet the needs.
  (6) There is a need for programs that provide self-exploration and career development through supervised work experience.
  (7) There is a need for the development of ancillary services to include: training and salaries of coordinators, development of curriculum material, clarification of the role of the teacher-coordinator, establishing patterns for cooperative vocational education, community involvement, reimbursement of employers, added costs to students, priorities in funding, serving needs of students, and revision of laws governing the employment of minors.
  (8) The 1968 Amendments to the Vocational Education Act of 1963 provided special funding for:
    (a) Training and support of coordinators
    (b) Funding of related work-experience
    (c) Reimbursement of added costs to employers
    (d) Student costs (for tools, uniforms, transportation)

(9) Recommendations were for needs for greater lead time in planning (5 years), priority funding, use of private (nonprofit) schools, advisory committees, identifying the role of labor (unions), examination of rural versus metropolitan programs, and identification of the community role.

C. Stenner, Jack, "Accountability by Public Demand", American Vocational Association Journal, February, 1971, pp 33-37.

- This emphasizes the need for accountability in education.
- The main points presented are:
  (1) One out of four youngsters in school is failing.
  (2) There was a call for accountability in a 1970 speech by President Nixon.
  (3) Examples of accountability in education include performance contracting in education, e.g., Dallas and Texarkana projects, 1969-70.

D. Voelkner, Alvin, "What Every Educator Should Know About Evaluation", American Vocational Association Journal, September, 1971, pp 59-61.

- This emphasizes the need for evaluation in education.
- The main points presented are:
  (1) Most educators have a narrow view of evaluation.
  (2) There is a need for establishing behavioral objectives with experimental and follow-up studies.
  (3) Little has been done in the area of cost-benefit studies.
  (4) Educators are kept busy with numerous changes.

E. Price, Ray G., and Hopkins, Charles R., Review and Synthesis of Research in Business and Office Education, (Research Series No. 55, VT010722), Columbus: ERIC Clearinghouse for Vocational and Technical Education, April, 1970.

- This includes a review of various programs and trends.
- The results of some of the studies of cooperative and work-experience programs are:
  (1) Miller (1968), found no significant differences to show that work-experience programs contributed to holding power of students.

(2) Bledsoe (1968), found that rejection of diversified vocational programs, on the basis that students are denied the opportunity for general educational development, is neither justified nor realistic.

(3) Driska (1967), reported that cooperative office education should be the most frequently offered office education program and preferably at the senior level. Cooperative students should be selected on the basis of a career objective and employability needs with non-cooperative programs for other students.

(4) Hodge (1968), studied the role of cooperative office education in the development of favorable work attitudes. He found that both cooperative and non-cooperative students had favorable work attitudes with any differences attributed to chance.

(5) Lewis (1966), and Pendleton (1968), surveyed various cooperative office education programs and identified problem areas as: scheduling of students' classes, selection of competent trainees, lack of coordinating time, placement and lack of training stations, and inadequate school facilities.

(6) Lee (1966), studied programs to serve the needs of low-average students who were found to benefit from the programs. However, most of the students enrolled in cooperative office education were above-average ability. Problems centered on obtaining training stations for below-average students, development of appropriate personal qualities, and lack of adequate instructional material for such students.

- Additional areas of coverage include: instructional materials, learning processes and teaching methods, student personnel services, facilities and scheduling, teacher education, administration and supervision, evaluation, and research trends.

Two main points that seem to emerge from the studies outlined above are:

- The concept of accountability in education is stressing the need for sound evaluation of programs and methods.
- There is no clear-cut evidence based on evaluation studies to indicate the relative importance or worth of the co-op method versus the non-co-op method in vocational education.

Summary of Current Views on Vocational Education

We can see that vocational education has received a new stature in education over about the last decade. Federal legislation has given impetus to vocational education and this impetus has given rise to the philosophy of career education. We see further that leaders in vocational education are espousing the worth of work experience as part of the learning experience. Finally, there is a need for evaluation to show the measurable differences in the results of various programs and instructional methods. We reason that these points, particularly the last point, prompted the U.S. Office of Education to sponsor this exploratory study to gain some initial insights into the cost-effectiveness of co-op versus non-co-op vocational education.

Cost-Effectiveness Analysis

There are scores of published items on the subject of cost-effectiveness analysis. These books, articles, and monographs consider the theoretical concepts involved in cost-effectiveness analysis and include applications of the analysis to a specific subject or content area. Our purpose in this section is to present some views on the theoretical concepts and show some examples of analyses that relate to education in general, and some examples specifically related to vocational education.

In this section we are drawing from the literature in part and from the experiences we have had in performing various cost-effectiveness analyses.

The General Concept of Cost-Effectiveness Analysis

It is common to find in the literature references with "cost-effectiveness", or "cost-benefit" in the titles. These terms can be defined differently in each context, or can sometimes be seen used interchangeably. By and large there appears to be a distinction, somewhat as follows.

- Cost-effectiveness generally means the amount of money it takes to produce a certain effect, where the effect is measured on some scale other than a dollar scale.*
- Cost-benefit generally means the amount of money it takes to produce a certain benefit, where benefit is translated into some monetary scale, e.g., the present value of future earnings, rate of return on investment, profit, etc.**

For the purposes of this study we have used the definition of cost-effectiveness as stated above. We have used this term to mean a display of the output (measured in several ways) versus the input (measured in dollar terms). In the case of studying vocational education, the output is measured mostly in terms of what happens to students after they graduate, e.g., percentage of students who gain full-time employment within three months, average entry wage level, average wage level after several months of employment, etc. The cost is the dollar value of resources, technologies and policies used during the educational period, based on some standard unit of time--generally an annual cost. The measures of effectiveness and the costs are displayed separately. No attempt is made to combine the costs and measures of effectiveness. It is important to point out that cost-effectiveness does not mean efficiency, cost reduction, or cost control.

Some Recent History on Cost-Effectiveness Analysis

The concept of cost-effectiveness has been emphasized greatly at the Federal level in the Department of Defense. Hitch and McKean*** explained the concepts and showed applications that had taken place prior to 1960. Much of the work had been accomplished through the research

* Heymont, I., Bryk, O., Linstone, H., and Surmeier, J., Guide for Reviewers of Studies Containing Cost-Effectiveness Analysis, Draft, Research Analysis Corporation, McLean, Va., July, 1965.

** Barsby, Steve L., Cost-Benefit Analysis and Manpower Programs, D.C. Heath and Co., Lexington, Massachusetts, 1972, pp 1-21.

*** Hitch, Charles J. and McKean, Roland N., The Economics of Defense in the Nuclear Age, Harvard University Press, Cambridge, 1963.

efforts of the U.S. Air Force and the RAND Corporation. In this book the concepts and difficulties of cost-effectiveness analysis are presented. It would not be correct to say that the U.S. Department of Defense, the U.S. Air Force, and the RAND Corporation were the creators of either the concepts or the applications of cost-effectiveness analysis. But, it would be fair to say that the attention given to cost-effectiveness analysis by others in recent years has been due in great part to the emphasis given by DOD, USAF, and RAND.

It is necessary to say that Hitch and McKean were not addressing cost-effectiveness per se. They were showing how it was possible to use more formal planning and analysis techniques to aid in top-level decision making and policy formulation.

Goldman* also covers some of the history of cost-effectiveness analysis. He dates the initial efforts some time about the beginning of World War II, but under the general title of "operations research". The first chapter by Edward S. Quade** is an introduction and overview to cost-effectiveness analysis that is concise and presented very well. Quade shows that cost-effectiveness is a way to rank order a set of alternative ways to accomplish some objective. He shows that the costs and measures of effectiveness are generated through the use of models and data on the various alternatives. The effectiveness measures are the "pluses"; the costs are the "minuses". Given a criterion, usually to maximize effectiveness for a given cost, or minimize cost for a given level of effectiveness, the alternatives can be placed in a rank order. The ultimate decision makers then can see how best to proceed in accomplishing objectives.

There are several chapters on the application of the method to present-day programs. Capron's chapter*** on government domestic programs addresses the role of the Bureau of the Budget (now the Office

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* Goldman, Thomas, A., ed., Cost-Effectiveness Analysis, New Approaches in decision-Making, Praeger, New York, 1968.

** Ibid., pp 1-16.

*** Ibid., pp 131-39.

of Management and Budget) in domestic programs and also points out some deficiencies in the use of cost-effectiveness analysis. Besen, Fechter, and Fisher* write on the "War on Poverty". They show how difficult it is to establish measures of effectiveness for a wide-scale program such as the "War on Poverty".

Kain's chapter on Metropolitan Transportation Systems** is a summary of a detailed analysis of urban transportation carried out by the RAND Corporation under a Ford Foundation grant and corporate funds.

These last three case studies show how diverse the method can be in its applications. Thus, we see that the basic concepts originated in the military arena, and expanded into the social and urban arenas.

Cost-Effectiveness Analysis and Planning-Programming-Budgeting Systems

It is more prevalent recently to find references to planning-programming-budgeting systems (PPBS) than to cost-effectiveness analysis. The PPBS concept is more encompassing than cost-effectiveness which is included as a major part of PPBS. It is difficult to find the exact beginnings for PPBS but once again they appear to be related to the analyses done by the Department of Defense, the U.S. Air Force and RAND Corporation.

David Novick's book on program budgeting*** goes over much of the same concepts covered in early references. Part II**** of the book addresses several broad program areas, namely, the Department of Defense, The Space Program, Transportation, Education, Federal Health Expenditures, and Natural Resources. These are wide-scale national programs.

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* Ibid., pp 140-54.

** Ibid., pp 155-87.

*** Novick, David, ed., Program Budgeting, Program Analysis and the Federal Budget, Harvard University Press, Cambridge, Mass., 1965.

**** Ibid., pp 81-282.

To simplify the differences between cost-effectiveness analysis and PPBS, we could say that in order to use the concept of cost-effectiveness analysis, it is necessary that objectives be established in measurable terms and that costs be captured for the uses of resources that are directed toward achieving those objectives. Thus, it is not surprising to see that there needed to be a directed effort to establish those components needed to perform analyses that were more formal, in an effort to do a better job of making decisions in Federal agencies or other organizational entities. The result was a concept called Planning-Programming-Budgeting Systems. In most references the term PPBS includes the following steps:

- Develop goals and objectives
- Develop a program structure
- Define measures of effectiveness directly related to the objectives
- Identify alternative approaches to accomplishing the objectives
- Perform cost-effectiveness analyses to rank-order the alternative approaches
- Allocate resources to all programs by establishing the "best" sets of alternatives
- Budget dollars to the programs on the basis of the resource allocation procedure
- Evaluate the results of the whole process and provide feedback to the next cycle in the planning process.

The PPBS concept includes those elements that are needed to conduct more formal planning and provide a stronger foundation for the decision-making function.

One final point--it is not uncommon to see other nomenclatures for the same, or similar concepts, all containing approximately the same elements outlined above. Some of these are:

- PBS--Program-Budgeting Systems
- PPBES--Planning-Program-Budgeting-Evaluation Systems
- RMS--Resource Management Systems
- RAS--Resource Allocation Systems
- RADS--Resource Allocation Decision Systems.

Cost-Effectiveness Analysis in Education

In the education area, it is much more common to find references to cost-effectiveness analysis under the general titles of Planning-Programming-Budgeting Systems, or Systems Analysis, or Resourse Management. The following are excellent recent references on the subject.

- Hartley, Harry J., Educational Planning-Programming-Budgeting, A Systems Approach, Prentice-Hall, Englewood Cliffs, 1968.

  This is a very good book that covers the concepts of PPBS, including cost-effectiveness analysis. It includes descriptions of some project applications and discussions of the issues and implications of implementing PPBS in school systems.

- Pfeiffer, John, New Look at Education, Systems Analysis in Our Schools and Colleges, Odyssey Press, Div. of Western Publishing Co., New York, 1968.

  This is a brief view of systems analysis in education. It is the product of a survey sponsored by Educational Testing Service of Princeton, New Jersey. It contains some reports of applications and brief explanations of some methods emerging out of the general field of systems analysis.

- Curtis, William H., Educational Resources Management System, Research Corporation, Association of School Business Officials, Chicago, 1971.

  This is the result of a research project to develop a conceptual design for an integrated system of a planning-programming-budgeting-evaluating system, appropriate for local school districts. It contains an extensive bibliography of references on work in formal planning in education.

- Koerner, Thomas F., PPBS and the School: New System Promotes Efficiency, Accountability, Education U.S.A. Special Report, National School Public Relations Association, Washington, D.C., 1972.

  This is a very brief, but well done report that contains the basic concepts of PPBS as applied to educational systems. It contains brief examples of some of the basic steps that have been implemented in various school systems.

- Riffel, J.A., Watts, H.N., Mudson, J., Program Accounting and Budgeting in Alberta: Retrospect and Prospect, Human Resources Research Council, Edmonton, Alberta, 1972.

This is an account of what has been done in Alberta in implementing PPBS in the school systems. It contains recommendations for future applications. (Canada appears to be seriously committed to applying PPBS concepts in education.)

There are numerous publications and reports by RAND Corporation on the subjects of PPBS and cost-effectiveness analysis in education. Two authors that appear often are Ms. Sue A. Haggart and Ms. Margaret B. Carpenter,* both senior staff members at RAND Corporation, Santa Monica, California.

There is a theme that runs through all of the work on PPBS and cost-effectiveness--there is a need for more formal planning in all arenas, including education; the concepts and methodologies of PPBS and cost-effectiveness analysis help to fill this need.

Analyses Pertaining to Vocational and Technical Education

There are several recently reported studies of cost-benefit** analyses that deal with various parts of vocational and technical education. A book by Steve Barsby on cost-benefit analysis of manpower programs contains the results of several recent studies.*** Chapter 2 pertains to vocational education in secondary schools. Barsby describes Arthur Corazzini's study of vocational education in Worcester, Massachusetts.****

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* For example:

Carpenter, M., Derr, C.B., Haggart, S.A., A Symposium on Educational Planning and Program Budgeting: An Analysis of Implementation Strategies, presented to The Annual Meeting of the American Educational Research Association, October, 1971.

Haggart, S.A., Barro, S.M., Carpenter, M.B., Dei Rossi, J.A., Rapp, M.L., Program Budgeting for School District Planning: Concepts and Applications, Memo. RM-6116-RC, The RAND Corp., November, 1969.

** In these studies the benefits are measured in dollar terms.

*** Barsby, S.L., Cost-Benefit Analysis and Manpower Programs, D.C. Heath and Co., Lexington, Mass., 1972.

**** Corazzini, A.J., "The Decision to Invest in Vocational Education: An Analysis of Costs and Benefits", J. of Human Resources, 3, Supp. 1968, pp 88-120.

The following outlines the major points of Corazzini's study as reported in Barsby's book.

- The study compared costs of vocational high schools and academic high schools in Worcester, Massachusetts, for 1963-1964.
- Benefit data came from a sampling of starting wages at 12 large manufacturing firms.
- Cost information included operating expense, costs borne by students, foregone earnings, and an adjustment for property taxes not paid schools.
- Total annual social costs per student in vocational schools exceeded those in academic schools by $678.
- The survey of wages paid graduates showed a wage advantage of vocational graduates over academic graduates of from $.04 to $.28 per hour, or $80 to $560 per year.
- Corazzini did not calculate benefit-cost ratios, but he did calculate pay-back periods. The present value of vocational graduates' increased earnings will never equal the present value of additional costs if the wage differential is only $80 per year. This is the case if either a 5 or 10 percent discount rate is used. If the wage differential is $560 per year and a 5 percent discount rate is used, the pay-back period is 6 years. The time increases to 10 years if a 10 percent discount rate is used.
- Recalculations of benefit-cost ratios, using common methods, results in different conclusions than those reached by Corazzini. Using a 10 percent discount rate and a ten-year time horizon, and a wage differential of $.18 per hour (based on Max Eninger's nation-wide data*) results in a benefit-cost ratio of 1.3. This indicates that vocational high schools have returned economic benefits in excess of costs.

It is interesting to note that if certain assumptions of the analysis are modified, the conclusions can be completely reversed. This is one of the real problems in making a cost-benefit analysis, or for that matter any other analysis.

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* Eninger, Max U., The Process and Product of T & I High School Level Vocational Education in the United States: The Product, Pittsburgh, American Institutes for Research, 1965.

Chapter 2 in Barsby* includes information on studies in vocational education in Pennsylvania. One is by Kaufman and others, on differences of costs of educating students in vocational and in comprehensive high schools in Pennsylvania.** Another is a study by Kaufman and Lewis on vocational education in one Pennsylvania city.*** Taussig's study of vocational education in New York City is described.**** Taussig found that annual operating costs per student were $974 in academic schools and $1,391 in vocational schools in 1965. Annual capital costs were estimated at $214 per student for academic schools, versus $306 for vocational schools. Thus, costs in vocational schools totaled $509 per student per year more than in the academic schools. Questionnaires mailed to students were used to collect benefit data. Some pertinent points about the study are:

- There was good evidence that vocational schools were under utilized; thus adding more students would not proportionately increase the cost per student.
- Some vocational schools were utilized for evening classes.
- Taussig feels that capital costs probably have been underestimated in vocational schools because the original estimates did not allow for replacement of equipment.
- Vocational graduates experience less unemployment following graduation than do graduates of academic high schools. This is particularly the case for males.
- Vocational graduates did not seem to earn a wage premium over academic graduates.

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* Barsby, loc. cit.

** Kaufman, Jacob J., Teh-wei Hw, Maw Lin Lee, and Stromsdorfer, Ernest W., "A Cost-Effectiveness Study of Vocational Education", A Comparison of Vocational and Non-Vocational Education in Secondary Schools, Institute for Research on Human Resources, University Park, 1969.

*** Kaufman, Jacob J. and Lewis, Morgan V., The Potential of Vocational Education: Observations and Conclusions, Institute for Research on Human Resources, University Park, 1968.

**** Taussig, Michael K., "An Economic Analysis of Vocational Education in New York City High Schools", Journal of Human Resources, 3, (Supp. 1968), pp 59-87.

- High school training apparently does not decrease the time the graduates must spend as apprentices.
- Taussig does not calculate benefit-cost ratios but he concludes that there is no firm evidence that vocational schools in New York City yield positive economic benefits.
- If benefit-cost ratios are calculated, they are greater than one. Depending on the time horizon and the discount rate, the ratio can be as high as 4.3.

Once again, a change in assumptions and the analysis approach can change the conclusion.

The two studies by Kaufman and others in Pennsylvania concluded that when vocational education in vocational-technical schools is considered as an alternative to a general education, there is a favorable benefit-cost ratio. But Corazzini and Taussig in their analyses showed that this was not necessarily the case. However, if the data from the two latter studies is analyzed in a commonly accepted cost-benefit manner, then there is agreement that vocational education has a favorable benefit-cost ratio.

Barsby points out that the benefit-cost ratios must be interpreted cautiously. There are many qualifications that must be made in the case of all such studies. It is important to separate differences by vocational program. It is important to understand the assumptions and the factors used in performing benefit-cost calculations. The cost-benefit methodologies can be very helpful in guiding the future of vocational education, but they should only be used as one part of the decision-making process.

Carroll and Ihnen report on a study of technical education in North Carolina.* This study dealt with post-secondary technical schooling. The study involved analyses of two groups of people--one group that had two years of post-high school technical education and one group that had no formal or occupational training after graduation

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* Carroll, Adger B. and Ihnen, Loren A., Costs and Returns for Investments in Technical Schooling by a Group of North Carolina High School Graduates, Dept. of Economics, North Carolina State University, Raleigh, 1967.

from high school. Information was obtained on high school graduates, and they were divided into two groups, depending on whether they obtained post-secondary training (Gaston Tech) or directly entered the labor force. Income data were collected from both types of graduates, covering a period of seven years, i.e., from 1957 to 1964. Interviews were conducted with the graduates to collect four types of information:

(1) Information concerning any employment restrictions

(2) Income and employment history back to the date on which Gaston Tech graduates enrolled for technical training

(3) Information on income-related characteristics

(4) General information.

The sample included 45 graduates of Gaston Tech and 45 other high school graduates who had similar characteristics.

The costs of schooling included the loss of productivity, plus the cost of providing school facilities, supplies and personnel. The total cost of schooling was obtained by adding costs borne by the students, his family, friends or nongovernmental organizations to the government (public) share of the costs of schooling. Actual expenditures by students averaged $770 per student for the four semesters of schooling. The estimate of average labor income Gaston students could have earned during the school period was $5,934. Correcting for part-time employment, this figure was reduced to $5,197 per student. Average private cost for schooling was $4,920 per student.

Public costs for G.I. Bill, unemployment transfer payments, and public support for Gaston Tech amounted to $2,505 per student. Thus, the total cost was $7,425 (i.e., $4,920 + $2,505).

Two projections of future returns were made. The first projection used a maximum income advantage of Gaston graduates of $1,482 per year in the fourth year after graduation, which was then projected for 38 years to retirement. The second projection used income data from the 1960 census. The estimated average lifetime

income gain from the investment in technical schooling was $57,357 using the first projection method, and $123,570 using the second projection method. By either projection the costs are repaid several times--7.6 for the first projection and 16.6 for the second. The rate of return on investment was calculated to be 16.7 percent for the first projection method, and 20.1 percent for the second projection method.

The Gaston Tech graduates also had many advantages in fringe benefits, such as a shorter work-week, more paid vocation, holidays and sick leave, and others.

On the basis of this study and analysis, there is no question that the additional schooling is well worth the investment.

Gallaway and Ghazalah* performed a cost-benefit study of vocational education in Ohio. The study examined and evaluated the private and social costs and returns accruing from the investment in vocational education at the senior high school level in Ohio. Data were collected on fourteen vocational programs in eighteen high schools (both vocational schools and general high schools with vocational curricula). Seventeen different geographical locations in Ohio were used, including urban--small and large cities, and rural centers. Benefit-cost analysis was used to evaluate the investment in the vocational programs. Two sets of rates of return were estimated assuming: (1) vocational education as an investment in dropout prevention, and (2) vocational education as an alternative to completion of an academic high school education.

For the purpose of the analysis, earnings rather than wage rates were used in calculating benefits. Earnings were projected by incorporating life expectancy and labor force participation rates and a growth rate of earnings over time.

Interview visits were conducted at each school. Information was collected on: financial expenses incurred during the budgetary year 1970-71, the value of the school's physical property, total number

* Gallaway, Lowell E. and Ghazalah, Ismail A., The Role of Vocational Education in Improving Skills and Earnings in the State of Ohio: A Cost-Benefit Study, Div. of Vocational Education, Dept. of Ed., State of Ohio, Columbus, 1972.

of students in the schools, number of trainees and graduates in each of the vocational programs under study, the number of vocational instructors in each program and the total number of vocational and academic teachers in the school, and available follow-up data on vocational graduates. In addition, the current trainees filled out a questionnaire on some background characteristics and future plans.

The vocational programs studied were: Trade and Industrial, Agriculture, Business Office Education, Distributive Education and Home Economics.

The overall conclusion was that the investment by individuals and by society at large is worthwhile for the vocational programs that were studied. The median rates of return on investment in all but one of the vocational programs (child care program) exceeded the rate of interest reflecting the opportunity cost of the resources used in vocational education.

The State Department of Education in Ohio is currently involved in a detailed program to study vocational education in Ohio. The identifying acronym for the program is PRIDE (Program Review for Improvement, Development, and Expansion in Vocational Education).* PRIDE began as a pilot study in 1970 and has expanded greatly since then, this program will continue to expand throughout Ohio with the purpose of studying the quality of vocational education by measuring the educational process, product cost-effectiveness and cost-benefit relationships.

Summary of Current Views on Cost-Effectiveness Analysis

The concepts relating to cost-effectiveness analysis began being applied some time during World War II in studies involving military strategies. Further developments and applications received great impetus

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* For example--Tower, C.O., Procedure Guide for Vocational Education Instructional Programs Costs, State of Ohio, State Dept. of Ed., Columbus, 1971.

in the late 1950's and early 1960's through the efforts of the Department of Defense, The U.S. Air Force and RAND Corporation. During the last decade the concepts have expanded into many areas, other than the military. These include wide-scale public policy and social programs, including educational programs.

The concepts of cost-effectiveness analysis are often embodied in broader contexts, such as Planning-Programming-Budgeting Systems (PPBS). This is true in the applications in education.

There have been many studies that have used cost-effectiveness analysis or related analyses to study various educational programs. Some of these studies have considered vocational and technical programs. The studies in these program areas have resulted in disparate conclusions. In some instances these disparities can be questioned on the basis of the analysis and the assumptions that were used. In general, the findings in the vocational and technical education areas appear to show that the training is worth the cost.

There is no evidence that cost-effectiveness analysis has been used to compare co-op vocational education to non-co-op vocational education. Hence, this study is not duplicating any previous efforts. This exploratory study should help give impetus to a more wide-scale study of the cost-effectiveness relationships of co-op and non-co-op vocational education.

RESEARCH PROCEDURE AND TASK RESULTS

This exploratory study is primarily an information collection and analysis effort. Thus, one of the main research tasks was the development of instruments for collecting information from historical records, specifically on cost, effectiveness, descriptions of programs, and characteristics of students. The total research procedure involved the following tasks.

- Select a set of co-op and non-co-op vocational programs to study and select a sample of 12 school districts from which to collect information on the selected programs.
- Develop and design a set of instruments for collecting historical information on cost, effectiveness and descriptive characteristics of programs, and types of students in the programs.*
- Develop a procedure for analysis and interpretation of the data collected.
- Conduct a field study to collect the pertinent information.
- Analyze and interpret the information collected in order to meet the objectives of the study.

Each of these tasks is elaborated below in order to more fully describe the research procedure. The results of each of the first four tasks are included as a part of this description. The results of the last task--analysis and interpretation--is contained in a separate main section to aid the reader and to highlight the study findings.

Selection of Programs and School Districts

The Request for Proposals (RFP) included a section on Scope, which defined the size of the sample of school districts and suggested possible criteria to use in selecting the districts and the programs that should be considered. These guidelines are summarized as follows:

- Survey programs at the secondary level in approximately 12 school districts or areas including cooperative programs and other programs in the same vocational areas not using the cooperative methodology
- Locate districts in large cities, urban fringe, small cities, and small towns and rural areas.

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* The original intent of the study was to collect historical information that was already available from State or local sources. During the developmental phases of the study, USOE personnel strongly suggested that a survey be made of local employers who hire graduates of vocational programs. A brief employer questionnaire was developed and administered to satisfy this suggestion.

- Consider size and location of schools and programs, occupational areas, and range of students in programs.
- Consider the availability of cost and follow-up data.
- Consider the availability of regular occupational programs without the cooperative component for comparison purposes.

The RFP stated further that the selection of the actual districts or schools for study would be decided jointly by the contractor and the USOE technical monitor.

The first step in selecting programs was to clearly define the terms co-op and non-co-op vocational education. The definitions were developed early in the study with the help of expert consultants in vocational education. The following definitions were revised by the USOE technical monitor for the study, and were used throughout this study.

- Vocational education is defined for the purposes of this study to include only high school programs--usually the junior and/or senior years. A vocational program is intensive occupational preparation for a specific occupational objective, or a cluster of occupations and should not be confused with industrial arts programs which are more exploratory in nature.
- Co-op vocational education is defined to include the following characteristics.
  - The co-op student is involved in a productive employment situation directly related to his vocational objective.
  - There is a training plan for each co-op student.
  - There is at least one period of in-school instruction directly related to the student's vocational objective.
  - There is available a school-employed coordinator with adequate time for on-the-job supervision of the co-op student.
- Non-co-op vocational education programs are those that provide vocational training totally within the school environment.

Notice that the four-point definition for co-op vocational programs is very explicit and is aimed at distinguishing between co-op programs and programs that use work experiences that are not closely integrated with the in-school program. Some occupational programs with work experience or on-the-job training do not meet this stringent definition.

The next step was to develop a list of vocational programs that would be representative of the most common offerings in most school systems. The original list included:

Auto Mechanics
Cosmetology
Drafting
Dental Assistant
Data Processing
General Office
Stenographic
Electronics-Electricity
Machine Trades
Welding-Sheet Metal
Diversified Cooperative Training
Cooperative Office Education
Distributive Education (Co-op).

The next step was to make preliminary contacts with selected state vocational education directors.* This initial contact had several purposes:

- To determine whether cost information on co-op versus non-co-op vocational education was available at the state level.
- To determine whether student performance data on co-op versus non-co-op vocational education was available at the state level.
- To obtain a preliminary list of vocational schools from which we could obtain specific cost and performance data to complement data collected at the state level.
- To solicit the cooperation of both the state departments of education and the local school systems in the conduct of the study.

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* The USOE technical monitor and Battelle personnel agreed to limit the geographical area to approximately the Midwest.

The initial states contacted were Indiana, Michigan, Minnesota, Ohio, and Wisconsin.

The initial contacts led to the following results:

- Indiana did not have a wide breadth of programs.
- Michigan had some cost information at the state level but no student performance data. Several school districts could be used as participants.
- Minnesota did not have cost and performance data at the state level. Several school districts could be used as participants.
- Ohio was just beginning a state-level cost and evaluation study of secondary vocational education. Data were not yet available. Several school districts could be used as participants.
- Wisconsin had some cost information at the state level on federally supported co-op programs. Aggregated follow-up information was available, but it was only available in summary form and could not be separated on a student, or program basis. Several school districts could be used as participants.
- Cost and performance data were not readily available in a useful form at the state level, therefore, we would have to collect all data from the local school districts.
- The list of vocational programs that we had used was not inclusive enough, nor representative.
- The initial contacts at the state level were all very helpful and there was a general appreciation for the need to conduct this study. The state-level personnel were all willing to cooperate and thought that selected school districts would be willing to participate in the study.

During the period of delay to the project, caused by the instrument-approval process, we contacted several other state departments of education. We wanted to learn whether there there might be other co-op and non-co-op programs that we had not considered. We questioned the state vocational directors on these matters in Iowa, Kentucky, North Carolina, and Pennsylvania. The results of these contacts confirmed what we had learned previously about which programs to study and the need to collect data at the local level.

From these initial contacts we developed a set of programs that would most likely be representative in the states we were considering. This list is as follows:

- Auto Mechanics
- Drafting
- Electronics/Electricity
- Machine Trades
- Diversified Cooperative Training or Industrial Cooperative Training
- Stenographic
- General Office
- Cooperative Office Education
- Distributive Education Co-op.

These programs were approved by the USOE project monitor and were used as the base for the data collection effort. It is important to point out that these programs are generally either co-op or non-co-op. It does not seem that school systems have specific programs that use both the co-op and non-co-op method. There may be some states with school systems that utilize both methods for the same program area, but we were not able to find evidence of such cases. Most generally, the programs that are non-co-op are: auto mechanics, drafting, electronics/electricity, machine trades, stenographic and general office. The co-op programs are: diversified cooperative training or industrial cooperative training, cooperative office education and distributive education. This means that it is not generally possible to directly compare the co-op method to the non-co-op method within a specific program area. The one possible exception might be a comparison of general office to cooperative office education. This does not mean, however, that it is not useful to study the cost-effectiveness characteristics of the two methods. There is value in determining the cost per pupil for the various programs, and more importantly there is value in studying how well students do who have gone through the various programs. From an analysis viewpoint, the problem is that there is no way to "sort-out" the effects of the method and content of the program.

After having concurred on the programs that would be studied, we attempted to finalize the states and the school districts that would participate. However, the study was delayed by the instrument-approval process from approximately December, 1970, to April, 1972. This meant that the data collection phase could not begin until the fall of 1972. Prior to that time, it was mutually agreed by the USOE project monitor and Battelle that we would use the same programs previously agreed upon, and that we would use four school districts in each of three states -- Minnesota, North Carolina, and Ohio. Each of these states appeared to have representative programs of those we wished to study; each had agreed to participate (other states had also agreed to participate); and these three states allowed for some geographical dispersion. Admittedly, the East and West are not covered by using these three states, but for the purposes of an exploratory study, we were not concerned with geographical representation.

The three state directors of vocational education were contacted in September, 1972, and each was asked to help us in selecting four school districts in his state. They were given the programs that we wished to study and asked to suggest school districts in each of four categories -- large city, urban fringe, small cites, and small towns and rural areas. We stressed that it was very important that the school districts be willing to cooperate with us, since the data collection effort would be fairly extensive.

The final set of school districts that participated are as follows:

- Minnesota
  - -- South Washington Public Schools
  - -- Duluth Public Schools
  - -- Worthington Public Schools
  - -- Shakopee Public Schools
- North Carolina
  - -- Caldwell County School District
  - -- Charlotte-Mecklenburg School District
  - -- Eden School District
  - -- Winston-Salem Forsyth County School District

- Ohio
  - -- Lancaster City School District
  - -- Mentor Exempted Village School District
  - -- South-Western City School District
  - -- Lorain City School District.

Table 1 shows the general characteristics of the 12 school districts.

Development and Design of Data Collection Instruments

This was a major task on the study. The instruments and the analysis plan define the study in detail and are aimed at the accomplishment of the study objectives.

The development and design of the instruments were predicated on the following assumptions.

- There had been no previous attempts to collect cost and performance information to compare the co-op and non-co-op methods.
- The information that was to be collected was to be historical, i.e., we would not be collecting any new raw data.
- There is no single measure of the effectiveness of vocational education.
- There was no way of knowing at the outset the status of information files within the school districts.
- The school district personnel would be completing the instruments for us with no remuneration.
- The following objectives of the study were to be satisfied:
  - -- To identify and describe the various types of cooperative and non-cooperative vocational programs currently being conducted.
  - -- To obtain cost comparisons between vocational programs utilizing the cooperative method and regular vocational programs.

TABLE 1. PARTICIPATING SCHOOL DISTRICTS AND THEIR GENERAL CHARACTERISTICS

Name of School District	City Location of Central Office	General Characteristic of Community	Approximate Total District Enrollment	Number of Schools		
				High	Junior or Middle	Elementary
• Minnesota						
South Washington Co. Schools Independent School Dist. No. 833	Cottage Grove	Urban Fringe[a]	12,000	1	3	9
Duluth Public Schools Independent School Dist. No. 709	Duluth	Large City	22,900	4	5	32
Worthington Public Schools Independent School Dist. No. 518	Worthington	Small City	3,300	1	1	5
Shakopee Public Schools Independent School Dist. No. 720	Shakopee	Urban Fringe[a]	2,000	1	1	3
• North Carolina						
Caldwell Co. School Dist.	Lenoir	Small Town/ Rural	12,500	4[b]	-	14[c]
Charlotte-Mecklenburg School Dist.	Charlotte	Large City	79,000	10	21	73
Eden City Public Schools	Eden	Small Town/ Rural	4,900	1	1	9
Winston-Salem/Forsythe Co. Schools	Winston-Salem	Large City	48,000	5[d]	19[e]	
• Ohio						
Lancaster City School Dist.	Lancaster	Small City	8,800	1	3	10
Mentor Exempted Village School Dist.	Mentor	Small Town/ Rural	13,000	1	3	12
South-Western School Dist.	Grove City	Urban Fringe[f]	17,200	4[g]	5	18
Lorain City School Dist.	Lorain	Large City	17,600	3	2	16

(a) Minneapolis - St. Paul
(b) Grades 9-12
(c) Grades 1-8
(d) Grades 11-12
(e) 11, Grades 7-8; 8, Grades 9-10
(f) Columbus
(g) Includes 1 technical school

-- To assess the effectiveness of various types of vocational programs.

-- To obtain data on the type of students in various vocational programs, together with student performance in these programs.

-- To determine the present status of data availability for making successive in-depth analyses.

This last objective guided us to "over-design" the instruments. In other words, our initial design was very encompassing and included information that we knew not all districts would have. We were forced to delimit this perspective based on the results of the pretest and knowledge gained from initial contacts with the state departments of education.

The above list of assumptions, when viewed as a whole, mean that it was necessary to carefully balance the amount of information to be collected against the need to collect some useful information for cost-effectiveness purposes. We knew that if the job of completing the instruments was too formidable that no one would cooperate. But we wanted to be sure that we were collecting information that would indeed enable us to accomplish the study objectives.

The original design included a set of six instruments:

- School Data Summary--A very detailed set of cost elements and some descriptive elements for a given school.
- Vocational Education Program Data Summary, Part I--A fairly detailed set of cost elements and descriptive elements for a given vocational program.
- Laboratory Equipment Data Summary--A very detailed accounting of all items of equipment for a given program.
- Vocational Education Program Data Summary, Part II--A very lengthy instrument including descriptions of the instructional program and open-ended questions about certain program characteristics.

- Student Information by Individual Vocational Program--A tabular instrument for collecting descriptive and follow-up information on a sample of students within a given program.

- Teacher Characteristics--A tabular instrument for collecting some information on the vocational teachers within a program at a particular school.

These instruments were reviewed by:

Mr. Robert D. Balthaser, Assistant Director
Business and Office Education Section
Division of Vocational Education
Ohio Department of Education
(Battelle Consultant on the Study)

Dr. Robert M. Reese, Chairman
Vocational-Technical Education
College of Education
The Ohio State University
(Battelle Consultant on the Study)

Dr. Byrl Shoemaker, Director
Divison of Vocational Education
Ohio State Department of Education

Mr. Charles Besse
Vocational Director
Southwestern City Schools
Grove City, Ohio
(Pretest of Instruments)

Mr. Gerrit H. Wiegerink
Vocational Director
Muskegon Public Schools
Muskegon, Michigan
(Pretest of Instruments).

The last two individuals reviewed the initial instruments in detail for the pretest. As a result of these reviews and the pretest, the instruments were modified considerably. In general, the instruments were too detailed and contained elements that these individuals thought would not be able to be completed by any school district. Subsequent consultations with USOE personnel resulted in still further delimiting the

detail in the instruments. The USOE personnel also suggested very strongly that an employer questionnaire be developed and administered to some employers in each community. Battelle agreed to develop a brief attitudinal-type employer questionnaire that would be administered to a sample of fifteen employers in each community.

The final instrument package included five instruments:

(1) SCHOOL BUILDING COST DATA--FORM A

(2) INDIVIDUAL SCHOOL ENROLLMENT DATA--FORM B

(3) VOCATIONAL PROGRAM COST DATA--FORM C

(4) VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA--FORM D AND FORM E

(5) EMPLOYER QUESTIONNAIRE--FORM F.

These five instruments and the analysis plan were approved by the National Center for Educational Statistics (NCES) and The Office of Management and Budget (OMB). The five instruments and the corresponding instructions are shown in Appendix A. The reader should refer to this appendix in order to become acquainted with the instruments and the specific information that was collected.

Development of an Analysis Plan

The analysis plan was developed concurrently with the development of the instruments. It is important to keep in mind that our concept of cost-effectiveness clearly separates the cost aspect from the effectiveness aspect. In other words, for the purposes of this study, we were not trying to develop a cost-effectiveness ratio. We wanted to collect information on program costs and information on several indicators of effectiveness, and display the results. This exploratory study should be used as a guide for further in-depth studies, not as a final study to conclude what should be done about co-op versus non-co-op vocational education programs.

The following assumptions guided the development of the analysis plan with regard to cost.

- The cost information must be collected by program.
- The major proportion of the cost of a program is the direct instructional cost.
- The proportion of the school building that is used for the program should be allocated as part of the cost of the program.
- The annual cost of equipment should be allocated as part of the cost of the program.
- The cost information need not be precise in an accounting or bookkeeping sense.

We knew from experience in working with school districts that costs are not generally tabulated by program. We also knew that it would be unreasonable to collect very detailed information on indirect costs, and that there would be great variability in the manner in which indirect costs are allocated to programs--if indeed these allocations are made. Furthermore, we knew that it would be difficult to obtain equipment lists, with year of purchase and original cost, but we felt confident that a vocational director or a teacher could give a fairly accurate estimate of a total replacement cost for the lab equipment. Thus, we chose to collect cost information that would cover the major portion of the program cost, namely, direct instructional cost, allocated cost of building space, and estimated replacement cost of equipment. The cost analysis includes these three elements, and <u>should not be interpreted as the total cost to train students in a particular program</u>.

The following assumptions guided the development of the analysis plan with regard to effectiveness.

- There is no single measure that can be used to indicate the effectiveness of vocational education programs.
- The most significant measures of effectiveness of a vocational program deal with what happens to the student after he graduates, i.e., follow-up information.
- There may be some descriptive elements for either the programs or the characteristics of the students that can be used to identify the causal factors for variations in effectiveness.

- School systems should be making efforts to follow-up the graduates of programs to learn how well they do.

The employer questionnaire is a very elementary step in determining the attitudes of employers regarding co-op versus non-co-op vocational education. The underlying assumption for this limited survey is that an employer who has had experience with some employees who have graduated from co-op programs and some who have graduated from non-co-op programs can express his opinion or attitude about the experiences he has had with these employees. The results of this limited survey can be used as one additional measure of effectiveness. The analysis plan includes a comparison of the percentage responses in each category--Graduates of Co-op Programs, Graduates of Non-Co-op Programs, and No Significant Difference.

The following assumptions guided the analysis plan for descriptive data for the programs and the characteristics of the students:

- The programs should be described in quantitative terms, e.g., number of lab hours per week, number of weeks in on-the-job training, etc., rather than by written descriptions.
- The characteristics of the students should be obtained from information in the school's student file. This should be basic information, e.g., sex, race, I.Q., achievement test scores, etc.
- The descriptive data for both the programs and the students would be used to display the differences in the two methods of vocational education.

It is important to point out that the analysis plan for this exploratory study is not based on a sophisticated experimental design. There are many variables over which we had no control. Needless to say we could not select the exact set of programs that would be totally representative across the nation, nor could we choose any set of school districts within a given state. We could not force school district personnel to account for every item of data, nor could we insist that they complete every item of information on every form. Furthermore, we had to rely on the school districts to provide us a representative list of employers to use in the employer survey.

This analysis plan was aimed at satisfying the five objectives of this study.* It must be remembered that this is an exploratory study and is not intended to prove the worth of either the co-op or non-co-op method.

The Procedure and Conduct of the Field Study

The plan from the outset of this study was to initiate the data collection with a personal visit to each district. This field study was conducted as originally planned. The employer survey was conducted by mail, but this was not included in the original field study plan. The field study included a meeting with the appropriate vocational personnel at each of the state departments of education. We wanted to learn about the state level plans for cost and evaluation studies in vocational education. In this regard, there was an on-going cost and evaluation study being conducted in Ohio. The results are forthcoming shortly, but we are not sure about the timing for the dissemination of results.

The contacts for the field study originated with the state director of vocational education. The directors, or members of their staff provided candidate districts for us to contact. The superintendent of each district was then contacted and he either chose not to participate or agreed and referred us to the district's director of vocational education. Each of these directors was contacted by phone and the study was thoroughly explained. In some instances we mailed descriptive documentation to further clarify the study effort. Arrangements for personal visits were then made. These contacts and arrangements were made in September, 1972.

We began the trips the last week in September, 1972, and completed the last visit on October 16, 1972. The first few visits in Ohio were made by two- and three-man teams. All of the visits in Minnesota were made by one man; those in North Carolina by another; and the remainder of those in Ohio by another man. The trips to

* Refer to the section, PURPOSE AND SCOPE OF THE STUDY, page 4 of this report.

Minnesota and North Carolina included a discussion with vocational education personnel at the state level. Similar discussions were held earlier in Ohio.

In each of the districts the Battelle staff met with the director of vocational education and other personnel who the director chose to have present. The purposes and content of the study were carefully explained. Each data collection instrument was explained in detail. This entire session lasted between two and three hours depending on the number of people present and the number of questions raised.

At the time of the meeting we asked the vocational director to list the programs for which he could furnish data. This varied some from the original programs indicated by the directors for two reasons: (1) the director could see what information had to be collected, and (2) the definition of co-op vocational education excluded some work experience programs and other on-the-job training programs. On this latter point, we had explained very carefully our definition of co-op vocational education to the state personnel and to the district personnel, prior to our visits. For some reason, there were misinterpretations in some cases and therefore we had to exclude certain programs. In fact, in a couple of cases we had to exclude some non-co-op programs because they were not truly vocational programs. Another communication problem that plagued us concerned the purpose of the study. Although we emphasized repeatedly that we wanted to compare co-op versus non-co-op programs, many people interpreted this as a study of co-op vocational education. That is, they thought we were trying to prove the worth or non-worth of co-op vocational education.

It is important to know that we did not collect information on all of the vocational programs offered in the districts. We limited ourselves to those programs that we had agreed upon to study. Further, we did not collect information on all of the program offerings in all

of the high schools in the larger school districts. The district personnel were not willing to complete our lengthy instruments for all the offerings (in a given program) at all of the high schools. In these cases we asked them to give us information on a representative offering at one of the schools. (Some districts provided data on offerings at more than one school.)

We asked the vocational director to supply us with a list of the fifteen firms in the community that hired the majority of vocational graduates. Our original plan was to have the districts mail the employer questionnaire, but we decided that this would be one extra burden and thus did the mailing ourselves. In some instances the districts supplied more than fifteen firms. We mailed 200 questionnaires; 90 were completed and returned between the last week in November, 1972 and the first week in January, 1973.

We asked the districts to return the instruments by mid-November, 1972. We began to receive completed instruments the first week in December. The bulk of them were returned between mid-December and mid-January. We received the last set of completed instruments on February 5, 1973.

On the whole, this field study went very well. It is important to keep in mind that the districts received no remuneration for participating in this study. They should be acknowledged for the work they accomplished on this study. We estimate that it took between one and two man-weeks of effort in each district to complete the instruments. This is no small task for an already over-burdened staff!

ANALYSIS AND INTERPRETATION

The following sections of this report present detailed summaries of the analyses performed for the data collected on cost, effectiveness, and descriptive measures of the vocational programs surveyed. Brief summaries of the results and conclusions are contained in a subsequent section of this report.

Before proceeding to the analysis results, some comments about the study are in order.

The scope of the survey included 12 school districts. Within these twelve school districts, data were collected from 20 different high schools. Because of the man-hour requirements to provide the data and because of the fact that not all programs exist at each school, particular schools did not report on all of either the co-op or non-co-op programs covered by this study.

The data have been summarized into 14 program areas as follows:

Co-op

- Distributive Education
- Diversified Cooperative Training
- Cooperative Office Education
- Trade and Industry
- Cooperative Work Experience

Non-Co-op

- Auto Mechanics
- Auto Body
- Electronics/Electricity
- Drafting
- Machine Trades
- Special Office Training
- General Office
- Stenographic
- Welding.

Notice that some programs above were not in our original list, namely, Trade and Industry, Cooperative Work Experience, Auto Body, Special Office Training, and Welding. Data on these programs were provided by a few school districts and consequently were included in the analysis. The Trade and Industry program and the Cooperative Work Experience program have been included as co-op programs because the districts reported them as such. We are not certain that these programs meet our stringent definition of a co-op program. Diversified Cooperative Training includes programs entitled as Industrial Cooperative Training. Special Office Training is a program reported by one school that included training for clerk typist, clerk stenographer, and account clerk. Auto Body and Welding are each reported by just one school.

Programs were clustered into the 14 program areas listed above based upon our best judgment. It was not possible to make use of the USOE coding structure to identify programs because the schools did not report the number, or the number included only the leading digits, or there was a disparity between the codes reported on different data collection instruments for the same program.

In all of the analyses we have used a numerical code to identify the schools. We have not grouped the schools or the school districts in any way, e.g., by state, or by size, etc. There is no significance to the order in which the data is presented by school.

Although the school districts probably would have no strong objections to identifying the specific schools, we felt it best not to do so. Our purpose was to compare the co-op method and the non-co-op method, not to compare schools against schools, or districts against districts.

It is important to remember that this study is an exploratory study and could not hold to a rigorous experimental design or procedure. Most of the analyses are based upon simple statistics (tabulations, averages, simple regressions, etc.). The sample that we used is not really random, nor representative with respect to school districts, schools, programs, nor geographic location. In many cases, data were not available; consequently there are many missing data items. Some

data are not amenable to analysis because they exist in different forms. An example of this is the aptitude test scores which were reported as either raw scores, percentiles, or stanines, using many different instruments. Other data items are questionable since the analysis shows wide variations from those reported by the majority of schools.

We have performed those analyses which are appropriate for the types of data collected. Later in this report, we address the question of how to improve the data collection process based upon our experience. We do not want to give the illusion that the present analysis has great power, or statistical significance. However, we do feel that the study has been valuable as an exploratory study.

Cost Analysis

This section consists of three subsections. In the first subsection, the methodology for developing the cost measures is presented. Following this, a summary of the results of the cost analysis is shown. Finally, the interpretation of the results of the cost analysis is presented.

Methodology

The data used to develop the cost measures were collected from particular cost elements on the following instruments:

- FORM A. SCHOOL BUILDING COST DATA
- FORM C. VOCATIONAL PROGRAM COST DATA
- FORM D. VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA.

Copies of these forms appear in Appendix A of this report.

The first cost measure developed was the total yearly cost for each program. This total yearly cost consisted of the sum of three cost elements. There are:

- Building Construction Cost
- Direct Instructional Cost
- Laboratory Equipment Replacement Cost

Remember this total yearly cost does not include administrative or indirect costs or the cost of providing other academic training.

The building construction cost estimates were developed from data reported on FORM A. The cost of the original building and the year of construction were reported. This cost was inflated to equivalent 1971 dollars using building cost indices. The indices used were taken from published figures in the Engineering News-Record*. These figures list a basic building cost index of 100.00 for 1913, increasing to an index of 943.44 for 1971. It was assumed that any construction prior to 1913 also had an index of 100.00. The building construction cost for any given year was adjusted by multiplying by the ratio of the 1971 index to the index for the year of construction. After calculating the 1971 replacement value of the original building, the costs of remodeling and/or additions were also adjusted to 1971 equivalent dollars and added to the adjusted original building construction cost. This total cost was amortized over 25 years to yield a yearly cost. This number was then divided by the total square footage of the building, including additions, to yield a 1971 equivalent yearly building construction cost per square foot. The calculations to this point used only data from FORM A.

From FORM C, the square footage of building space used solely by the program and the square footage shared by programs were reported. The total square footage used by the program was calculated as:

$$SF = (SF)_1 + (SF)_2 \left(\frac{p_1}{100-p_2}\right)$$

where $(SF)_1$ = square footage used solely by the program

$(SF)_2$ = square footage shared with other programs

p_1 = percent of time shared facilities are used by the program

p_2 = percent of time shared facilities are not used (vacant).

The end result of this calculation is a partitioning of the total square footage of shared floor space among the programs sharing them, so that

* Engineering News-Record, Vol. 188, No. 12, March 23, 1972, p. 57.

costs of the floor space can be distributed among the sharing programs. This total square footage was multiplied by the yearly building cost per square foot described above, to yield the building construction cost estimate for each program. This calculation was performed for each individual program reported by a particular school.

The direct instructional cost was calculated from data reported on FORM C. It represents the sum of the costs for the following cost elements on that form:

- Total Teachers' Salaries*
- Personnel Fringe Benefits*
- Instructors' Mileage Expense-Transportation
- Consumable Supplies and Material Costs
- Laboratory Equipment Rental Costs
- Laboratory Equipment Contract Repair Costs.

(No schools indicated the use of teacher aides.) The costs for the elements listed above were calculated as averages based upon the actual expenditures for the two school years 1969-70 and 1970-71. This cost element was calculated for each individual program at a particular school.

The estimate of laboratory equipment replacement cost was also based upon data reported on FORM C. The data were collected in the form of three estimates--a lowest estimate, an average estimate, and a highest estimate of what it would cost in terms of 1971 dollars to replace all the equipment used by the program. These three estimates were averaged into an overall estimate using the following equation:

$$\bar{C} = \frac{C_\ell + 4C_a + C_h}{6} ,$$

where

C_ℓ = lowest estimate

C_a = average estimate

C_h = highest estimate

* Based upon full-time equivalents.

This method follows the procedures used in PERT-type analyses for such estimation problems.* The resulting average cost was amortized over 25 years for programs using heavy equipment and 10 years for programs using office equipment to yield an average yearly cost.

The sum of the three cost elements described above was used to represent the total yearly cost of a particular vocational program at a particular school.

From this total yearly cost measure, two other measures were developed. The first of these is the cost per student. From FORM D, the total numbers of 1970-71 senior and 1969-70 junior students were extracted. The sum of these two totals represent a yearly estimate of the total number of students being trained under a particular program. The cost per student was calculated as the ratio of total yearly cost to the total number of students for a particular program at a particular school.

Also from FORM D, the average number of hours per week spent in various instruction was reported. From this data, the total number of student hours was calculated as:

$$SH = T_J(SH_{JL} + SH_{JN}) + T_S(SH_{SL} + SH_{SN}) + T_C,$$

where

T_J = total number of 1969-70 juniors in the program

T_S = total number of 1970-71 seniors in the program

SH_{JL} = average number of hours per week in laboratory or shop vocational instruction, junior year

SH_{JN} = average number of hours per week in non-laboratory or non-shop vocational instruction, junior year

SH_{SL} = average number of hours per week in laboratory or shop vocational instruction, senior year

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* Hillier, Frederick S. and Lieberman, Gerald L., Introduction to Operations Research, Holden-Day, Inc., San Francisco, 1967, p. 230.

T_C = average number of hours per week spent in coordination by the teacher-coordinator (equals 0 for non-co-op vocational programs).

The cost per student hour was calculated as the ratio of the total yearly cost to the total number of student hours for a particular program at a particular school.

These then represent the cost measures which are presented in the following section.

Results of the Cost Analysis

Tables 2 through 15 present a summary of the cost measures used for the study for each of the 14 program types studied. One table is included for each particular program type. Within a program type, the cost measures are displayed for each school reporting on that particular program type. The five right-most columns summarize the basic measures derived, described in the preceding section of this report. The four cost elements entitled "Direct Instructional Cost", "Building Construction Cost", "Laboratory Equipment Costs", and "Total Yearly Costs" are yearly cost totals; they have not been prorated according to number of students, or number of student hours in these tables.

Table 16 presents a summary of the same data at the program level. The cost entries in this table represent weighted averages of the costs reported by individual schools. The net effect of the weighting is to divide total costs for each type of program (summed over schools) by the total number of students (or student hours) for each type of program (summed over schools). The four cost elements entitled "Direct Instructional Cost", "Building Construction Costs", "Laboratory Equipment Cost", and "Total Yearly Cost" in this table represent average costs per student; they do not represent total yearly costs for all schools in this case.

Several points become evident when Table 16 is considered. Considering first the Cost Per Student (measured as a yearly average), the table shows an average cost of $355 for co-op programs and $545

TABLE 2. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(CO-OP, DISTRIBUTIVE EDUCATION)

CO-OP
DIST.EDUCATION

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 1,(1)	9849.	699.	717.	11265.	212.	53.14	19.	592.90
SCHOOL NO. 3,(21)	19933.	1256.	367.	20556.	563.	37.17	105.	195.77
SCHOOL NO. 4,(22)	14691.	1177.	367.	16175.	325.	49.65	59.	273.48
SCHOOL NO. 5,(31)	11546.	1015.	950.	13512.	295.	45.80	55.	245.67
SCHOOL NO. 6,(42)	11473.	697.	205.	12372.	906.	13.66	76.	162.79
SCHOOL NO. 7,(51)	5297.	540.	250.	6088.	372.	16.36	18.	338.21
SCHOOL NO. 8,(61)	9230.	554.	500.	10284.	566.	18.15	77.	133.16
SCHOOL NO. 9,(63)	5637.	859.	0.	6496.	265.	24.51	47.	138.21
SCHOOL NO. 10,(71)	10535.	673.	200.	11408.	442.	25.79	19.	600.44
SCHOOL NO. 12,(81)	20217.	2995.	250.	23462.	765.	30.66	75.	312.78
SCHOOL NO. 14,(90)	11430.	918.	783.	13122.	225.	58.32	43.	305.16
SCHOOL NO. 15,(91)	15749.	754.	783.	17287.	200.	86.43	38.	454.92
SCHOOL NO. 16,(92)	11700.	1266.	783.	13749.	315.	43.65	61.	225.39
SCHOOL NO. 17,(133)	6265.	432.	140.	6837.	325.	20.42	44.	150.93
SCHOOL NO. 18,(117)	11329.	632.	0.	11961.	210.	56.96	38.	314.78
SCHOOL NO. 19,(120)	11740.	706.	25.	12471.	340.	36.68	65.	191.86

TABLE 3. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(CO-OP, DIVERSIFIED COOPERATIVE TRAINING)

CO-OP
DIV.COOP.TRAINING

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 1.(10)	15914.	242.	0.	16156.	147.	109.53	17.	950.33
SCHOOL NO. 2.(20)	13219.	947.	147.	14701.	711.	20.11	35.	408.59
SCHOOL NO. 3.(21)	14449.	1414.	48.	15942.	123.	129.61	31.	514.25
SCHOOL NO. 7.(50)	5297.	540.	100.	5938.	372.	15.96	18.	329.88
SCHOOL NO. 8.(51)	10380.	430.	80.	10810.	315.	34.32	55.	196.54
SCHOOL NO. 9.(60)	5156.	604.	0.	5760.	240.	24.00	42.	137.14
SCHOOL NO. 10.(70)	12591.	646.	27.	13264.	532.	24.91	23.	576.71
SCHOOL NO. 11.(80)	12057.	1344.	23.	14320.	215.	66.60	20.	715.99
SCHOOL NO. 18.(110)	11443.	632.	0.	12076.	101.	119.56	71.	170.08
SCHOOL NO. 19.(120)	10236.	352.	0.	10588.	150.	70.59	37.	286.17

TABLE 4. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(CO-OP, COOPERATIVE OFFICE EDUCATION)

CO-OP
COOP.OFFICE EDUCATN.

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 3.(21)	11960.	716.	3000.	15676.	275.	57.00	26.	602.91
SCHOOL NO. 4.(22)	13027.	666.	3000.	16693.	205.	80.46	19.	868.09
SCHOOL NO. 5.(30)	18344.	825.	2220.	21389.	740.	28.90	73.	293.00
SCHOOL NO. 9.(60)	4956.	2831.	707.	8494.	145.	58.58	13.	653.41
SCHOOL NO. 10.(70)	14935.	673.	858.	16466.	488.	33.78	21.	784.10
SCHOOL NO. 12.(81)	24234.	4497.	5750.	34477.	715.	48.22	70.	492.53
SCHOOL NO. 15.(91)	14158.	1656.	1200.	17014.	165.	103.11	15.	1134.25
SCHOOL NO. 17.(150)	6565.	432.	140.	6637.	90.	73.74	7.	948.08
SCHOOL NO. 18.(110)	12779.	1021.	0.	13801.	386.	35.75	15.	920.07
SCHOOL NO. 19.(120)	12878.	367.	65.	13310.	142.	93.41	17.	782.97

TABLE 5. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(CO-OP, TRADE AND INDUSTRY)

CO-OP
TRADE&INDUSTRY

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 5,(33)	15952.	664.	7000.	23616.	265.	89.12	22.	1073.47
SCHOOL NO. 6,(43)	10972.	139.	12.	11023.	220.	50.10	14.	787.33

TABLE 6. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(CO-OP, COOPERATIVE WORK EXPERIENCE)

CO-OP
COOP.WORK EXPER.

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 11,(88)	38752.	1344.	80.	40176.	930.	43.20	90	446.40

TABLE 7. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(NON-CO-OP, AUTO MECHANICS)

NON-CO-OP
AUTO MECHANICS

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 1.(16)	20705.	1675.	923.	25263.	1035.	24.41	46.	549.21
SCHOOL NO. 9.(62)	5122.	3114.	1200.	9436.	330.	28.50	22.	427.54
SCHOOL NO. 10.(73)	23143.	3445.	1087.	27675.	1035.	26.74	46.	601.43
SCHOOL NO. 11.(80)	33123.	9136.	3500.	45759.	1860.	24.60	93.	492.03
SCHOOL NO. 14.(93)	8583.	3211.	1600.	13395.	180.	74.42	12.	1116.23
SCHOOL NO. 20.(121)	25598.	2688.	1006.	29292.	788.	37.20	35.	836.91

TABLE 8. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(NON-CO-OP, AUTO BODY)

NON-CO-OP
AUTO BODY

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 2.(23)	10300.	2406.	480.	13186.	270.	48.84	27.	488.38

TABLE 9. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(NON-CO-OP, ELECTRONICS/ELECTRICITY)

NON-CO-OP
ELECTRONIC/ELCTRCTY

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STU.HRS.	COST PER STU.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 1.(10)	22921.	859.	869.	24650.	765.	32.22	34.	725.00
SCHOOL NO. 2.(20)	8990.	2310.	960.	13260.	270.	49.11	18.	736.67
SCHOOL NO. 3.(21)	11470.	1230.	1000.	13700.	270.	50.74	27.	507.42
SCHOOL NO. 7.(50)	9758.	1216.	1000.	11974.	330.	36.29	22.	544.28
SCHOOL NO. 9.(60)	4978.	1963.	1000.	7900.	230.	34.35	20.	395.01
SCHOOL NO. 10.(70)	14165.	1615.	700.	16460.	860.	19.14	43.	382.78
SCHOOL NO. 11.(80)	17836.	5374.	3590.	26680.	960.	27.79	48.	555.84
SCHOOL NO. 14.(90)	6574.	1355.	880.	8809.	225.	39.15	15.	587.28
SCHOOL NO. 20.(120)	21309.	806.	1133.	23249.	630.	36.90	29.	830.32

TABLE 10. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM (NON-CO-OP, DRAFTING)

NON-CO-OP
DRAFTING

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 1,(10)	20597.	959.	335.	21792.	697.	31.24	31.	702.97
SCHOOL NO. 2,(23)	12497.	1222.	120.	13840.	690.	20.06	45.	308.47
SCHOOL NO. 7,(55)	9037.	597.	320.	9959.	110.	90.46	16.	621.88
SCHOOL NO. 9,(51)	7315.	521.	140.	7976.	210.	37.98	42.	189.91
SCHOOL NO. 15,(72)	16315.	1023.	393.	17731.	740.	23.96	37.	479.23
SCHOOL NO. 23,(121)	24493.	1129.	427.	26049.	607.	42.88	27.	964.77

TABLE 11. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(NON-CO-OP, MACHINE TRADES)

NON-CO-OP
MACHINE TRADES

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 1,(13)	25214.	7975.	8307.	32495.	472.	68.77	21.	1547.39
SCHOOL NO. 3,(23)	12192.	2912.	4167.	17261.	660.	26.15	44.	392.29
SCHOOL NO. 7,(21)	11421.	2237.	2800.	16459.	480.	34.41	49.	344.05
SCHOOL NO. 9,(63)	4356.	2548.	2473.	9335.	405.	23.05	27.	345.74
SCHOOL NO. 12,(81)	25503.	7499.	10000.	42991.	1400.	30.71	70.	614.16
SCHOOL NO. 14,(90)	6762.	4817.	2600.	14179.	270.	52.51	18.	787.71
SCHOOL NO. 15,(91)	12441.	14476.	2433.	29751.	165.	180.31	11.	2704.60
SCHOOL NO. 20,(121)	22526.	2150.	6397.	31074.	765.	40.62	34.	913.93

TABLE 12. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(NON-CO-OP, SPECIAL OFFICE TRAINING)

NON-CO-OP
SPEC.OFFICE TRAINING

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 1,(10)	54254.	5908.	7500.	67662.	1451.	46.62	68.	995.04

TABLE 13. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM
(NON-CO-OP, GENERAL OFFICE)

NON-CO-OP
GENERAL OFFICE

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 5,(30)	12477.	825.	2220.	15918.	945.	16.84	63.	252.67
SCHOOL NO. 6,(40)	4607.	693.	2750.	8140.	190.	42.84	19.	428.43
SCHOOL NO. 7,(50)	9851.	937.	6093.	16882.	750.	48.21	14.	1205.13
SCHOOL NO. 8,(51)	8430.	387.	3500.	12287.	400.	30.71	40.	307.07
SCHOOL NO. 10,(70)	22934.	807.	1150.	24892.	720.	34.57	48.	518.58
SCHOOL NO. 12,(81)	26514.	10487.	8250.	45247.	1725.	26.23	115.	393.46
SCHOOL NO. 19,(120)	21981.	1347.	99.	23424.	638.	36.74	34.	688.93

TABLE 14. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM (NON-CO-OP, STENOGRAPHIC)

NON-CO-OP
STENOGRAPHIC

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 5.(35)	13214.	412.	1110.	14736.	1310.	11.25	109.	135.20
SCHOOL NO. 12.(81)	37177.	11981.	11250.	60408.	1650.	36.61	110.	549.16
SCHOOL NO. 19.(120)	10577.	670.	65.	11272.	431.	26.14	23.	490.08

TABLE 15. SUMMARY OF COSTS BY SCHOOL FOR EACH TYPE OF PROGRAM (NON-CO-OP, WELDING)

NON-CO-OP
WELDING

SCHOOL	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
SCHOOL NO. 13.(82)	12722.	2160.	7000.	21882.	880.	24.87	44.	497.34

TABLE 16. SUMMARY OF AVERAGE COSTS BY TYPE OF PROGRAM*

PROGRAM	DIRECT INSTRUCTIONAL COST	BUILDING CONSTRUCTION COST	LABORATORY EQUIPMENT COST	TOTAL YEARLY COST	NUMBER STD.HRS.	COST PER STD.HR.	NUMBER STDTS.	COST PER STUDENT
ALL PROGRAMS	362.	60.	44.	453.	42399.	75.12	3246.	453.19
CO-OP	312.	24.	19.	355.	13988.	40.35	1590.	355.03
DIST.EDUCATION	224.	18.	4.	246.	6715.	32.74	839.	246.45
DIV.COOP.TRAINING	328.	29.	1.	341.	2907.	40.99	349.	341.41
COOP.OFFICE EDUCATN.	482.	49.	61.	593.	3351.	48.87	276.	593.33
TRADE&INDUSTRY	745.	22.	195.	962.	485.	71.42	36.	962.20
COOP.WORK EXPER.	431.	15.	1.	446.	930.	43.20	90.	446.49
NON-CO-OP	405.	74.	66.	545.	28410.	72.55	1696.	545.21
AUTO MECHANICS	466.	91.	37.	594.	5227.	29.85	254.	593.66
AUTO BODY	381.	89.	18.	488.	270.	49.86	27.	489.38
ELECTRONICS/ELCTRCTY	466.	66.	43.	576.	4540.	72.71	266.	575.23
DRAFTING	454.	27.	9.	489.	3055.	71.96	192.	489.14
MACHINE TRADES	417.	148.	143.	708.	4627.	41.91	274.	707.97
SPEC.OFFICE TRAINING	798.	87.	110.	995.	1451.	66.62	69.	995.94
GENERAL OFFICE	322.	46.	72.	441.	4967.	29.55	333.	440.77
STENOGRAPHIC	252.	54.	51.	357.	3391.	25.49	242.	357.99
WELDING	299.	49.	159.	497.	980.	24.87	44.	497.34

* Costs shown in this table represent average cost per student, with the exception of the column entitled "cost per student hour" (cost per std. hr.).

for non-co-op programs. This is a differential of $190. However, if individual programs are considered, the variability of costs for the two methods, co-op versus non-co-op, is quite large. Several co-op programs show costs higher than non-co-op programs, and vice versa. If Tables 2 through 15 are considered, this variability becomes even more pronounced on an individual school basis. It becomes questionable then whether or not the $190 differential is meaningful in a statistical significance framework.

Furthermore, Tables 2 through 15 indicate that the principal contribution to the total yearly cost is in the direct instructional cost element, which in turn might indicate that the total number of student hours in the program might be an important normalizing factor. The reason for this is that the average hours per week spent in vocational laboratories and other vocational studies differs markedly for the two types of programs, viz.,

- 8.8 hours per week for co-op programs
- 16.8 hours per week for non-co-op programs.

Thus we see that there are about twice as many hours per week spent in school in the non-co-op vocational training as compared to the in-school co-op vocational training. This in turn might cause lower student-teacher ratios in non-co-op programs, and thus higher direct instructional costs.

Using the measure of cost per student hour, Table 16 indicates the following averages:

- $40.35 for co-op programs
- $32.55 for non-co-op programs.

This is a reversal of the relationship shown by the first measure, and indicates a differential of about $8. Once again, perusal of Tables 2 through 15 show wide variability in this measure and it becomes questionable whether or not this $8 differential is statistically significant.

In an attempt to further remove variations in the data, these measures were plotted against the student-teacher ratio. This is a very significant factor which influences the program cost. For example, if a program requires a teacher with a yearly salary of $10,000 and there

are only 15 students in the class, this part of the cost would be about $667 per student. On the other hand, if there were 30 students in the class, then this part of the cost would be about $333 per student.

Figure 1 shows the scattergram plot of cost per student versus student-teacher ratio for all programs (both co-op and non-co-op). The points plotted are individual data points for a given program at a particular school. A number on the plot indicates a coincidence of more than one point. Figure 2 shows a similar plot for co-op programs only. Figure 3 shows this plot for non-co-op programs. There appears to be a strong logarithmic relationship. This becomes evident in Figures 4, 5, and 6 which are the plots of the natural logarithm of cost per student versus the natural logarithm of student-teacher ratio for, respectively, all programs, co-op programs, and non-co-op programs. (One data point was outside the range of the plot for Figures 1 and 3. This is the point for Machine Trades for school number 15(91), with a cost per student of $2,704 and a student-teacher ratio of 11.)

Figures 7, 8, and 9 display the plot of cost per student hour versus student-teacher ratio for, respectively, all programs, co-op programs, and non-co-op programs. Once again the plots indicate a logarithmic relationship, although there appears to be more scatter than in the preceding figures. Figures 10, 11, and 12 which are plots of the logarithm of cost per student hour versus the logarithm of student-teacher ratio for, respectively, all programs, co-op programs, and non-co-op programs bear out the logarithmic relationship although, again, there appears to be more scatter than in the first set of figures dealing with cost per student.

The significance of these plots as well as the tabular summaries presented earlier are discussed in the following section of this report.

Interpretation of Cost Analysis

As indicated earlier, Table 16 shows a cost differential of about $190 in favor of co-op programs when considering the measure,

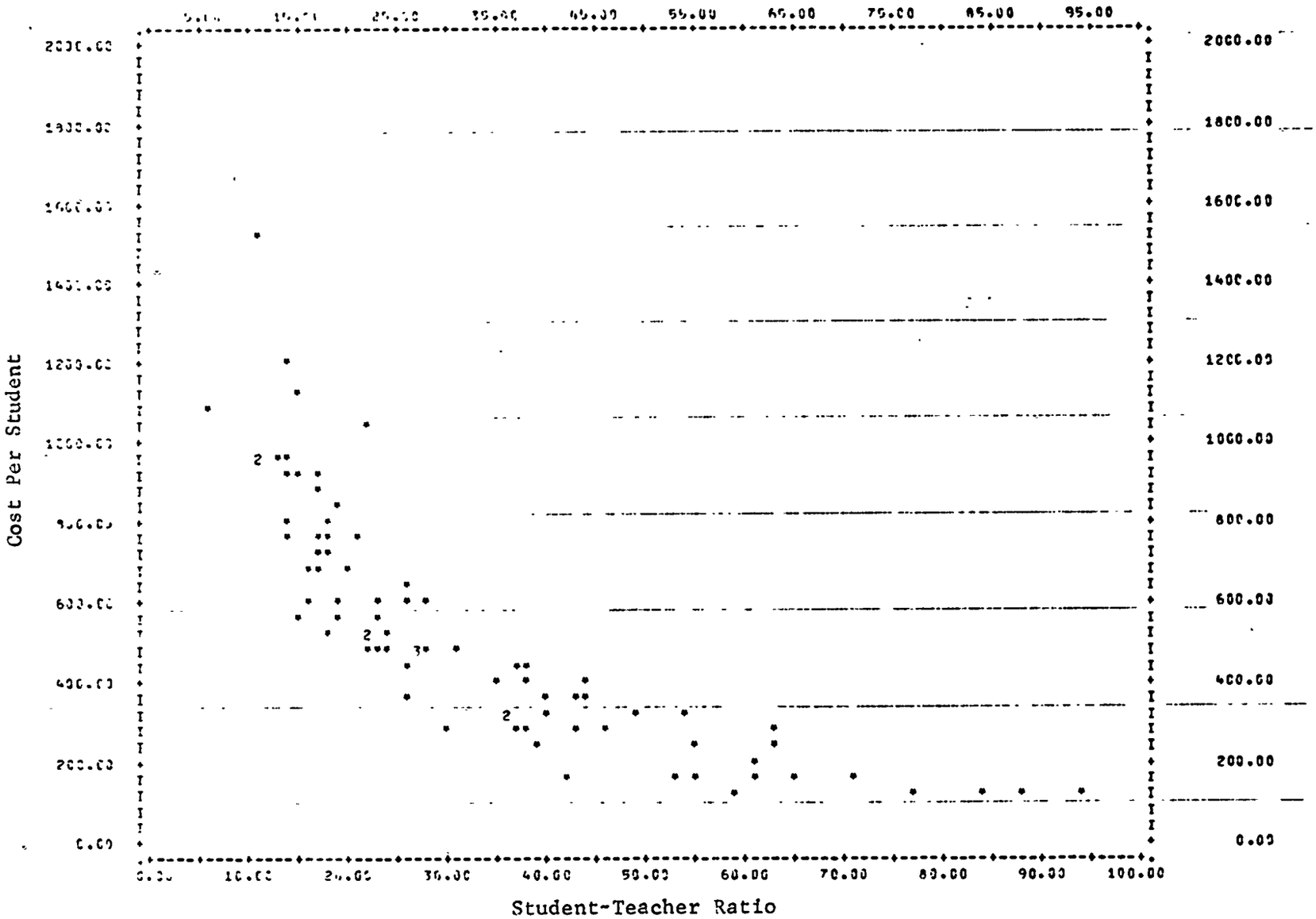

FIGURE 1. COST PER STUDENT VERSUS STUDENT-TEACHER RATIO FOR ALL PROGRAMS

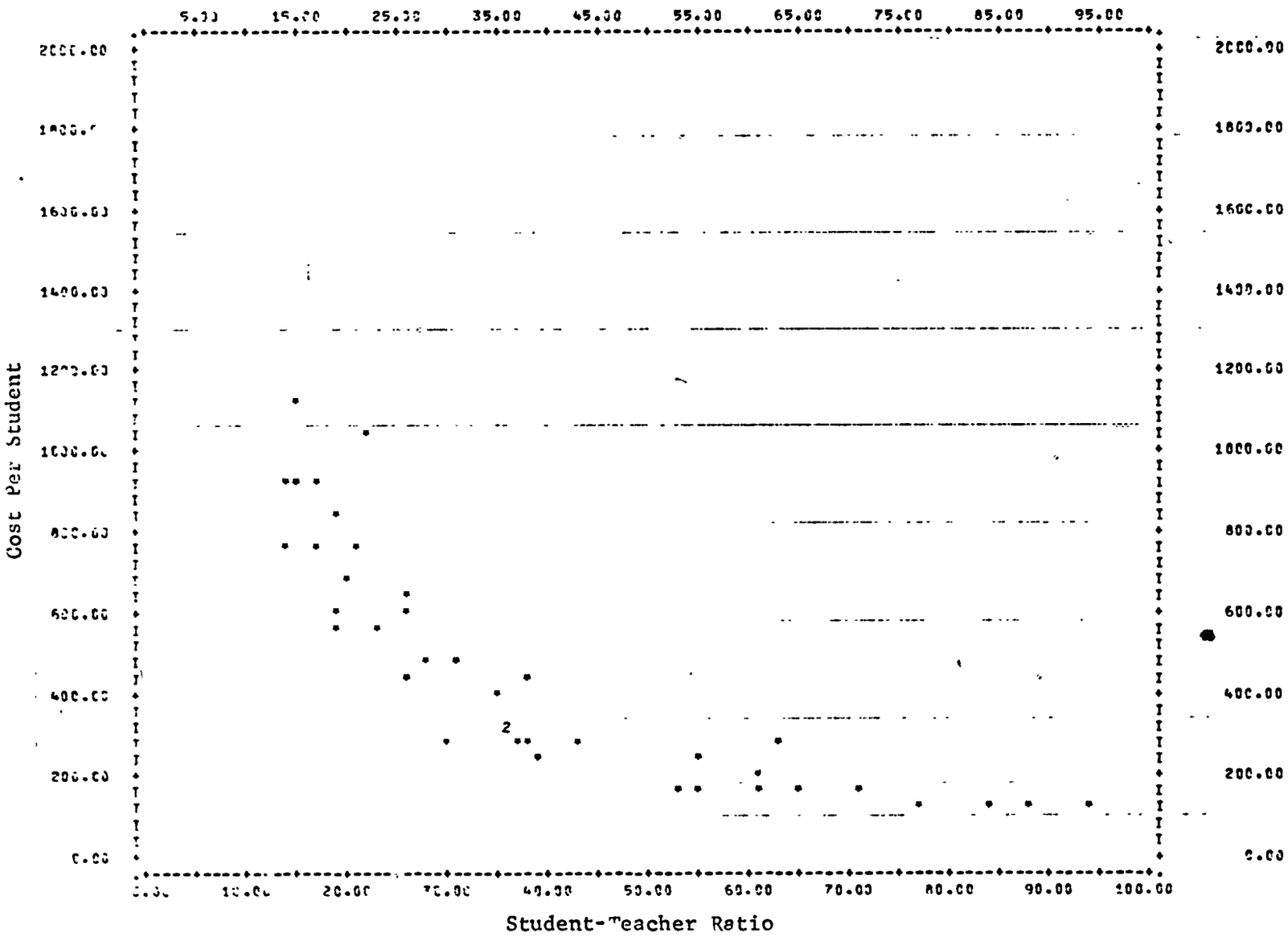

FIGURE 2. COST PER STUDENT VERSUS STUDENT-TEACHER RATIO FOR CO-OP PROGRAMS

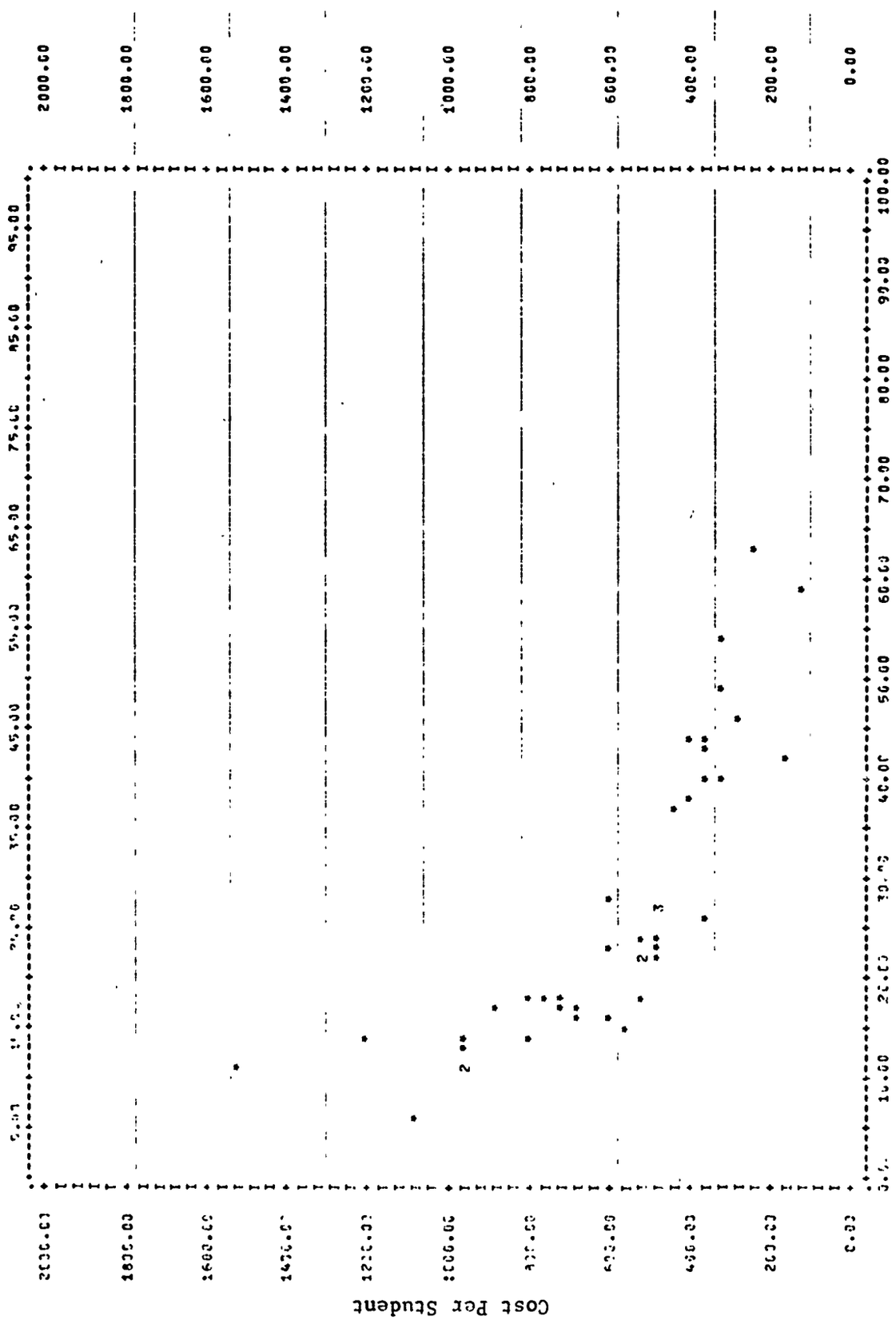

FIGURE 3. COST PER STUDENT VERSUS STUDENT-TEACHER RATIO FOR NON-CO-OP PROGRAMS

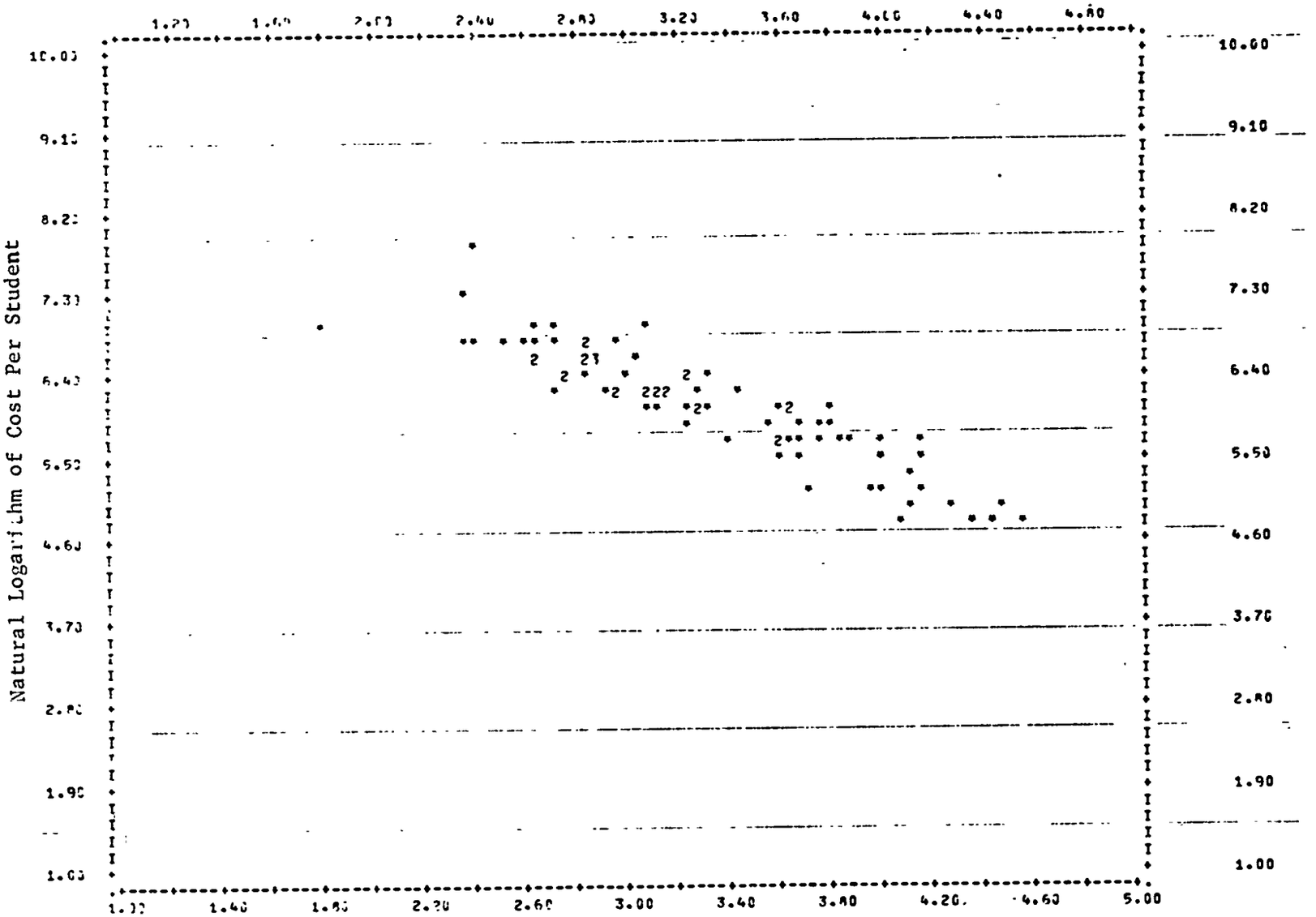

FIGURE 4. NATURAL LOGARITHM OF COST PER STUDENT VERSUS NATURAL LOGARITHM OF STUDENT-TEACHER RATIO FOR ALL PROGRAMS

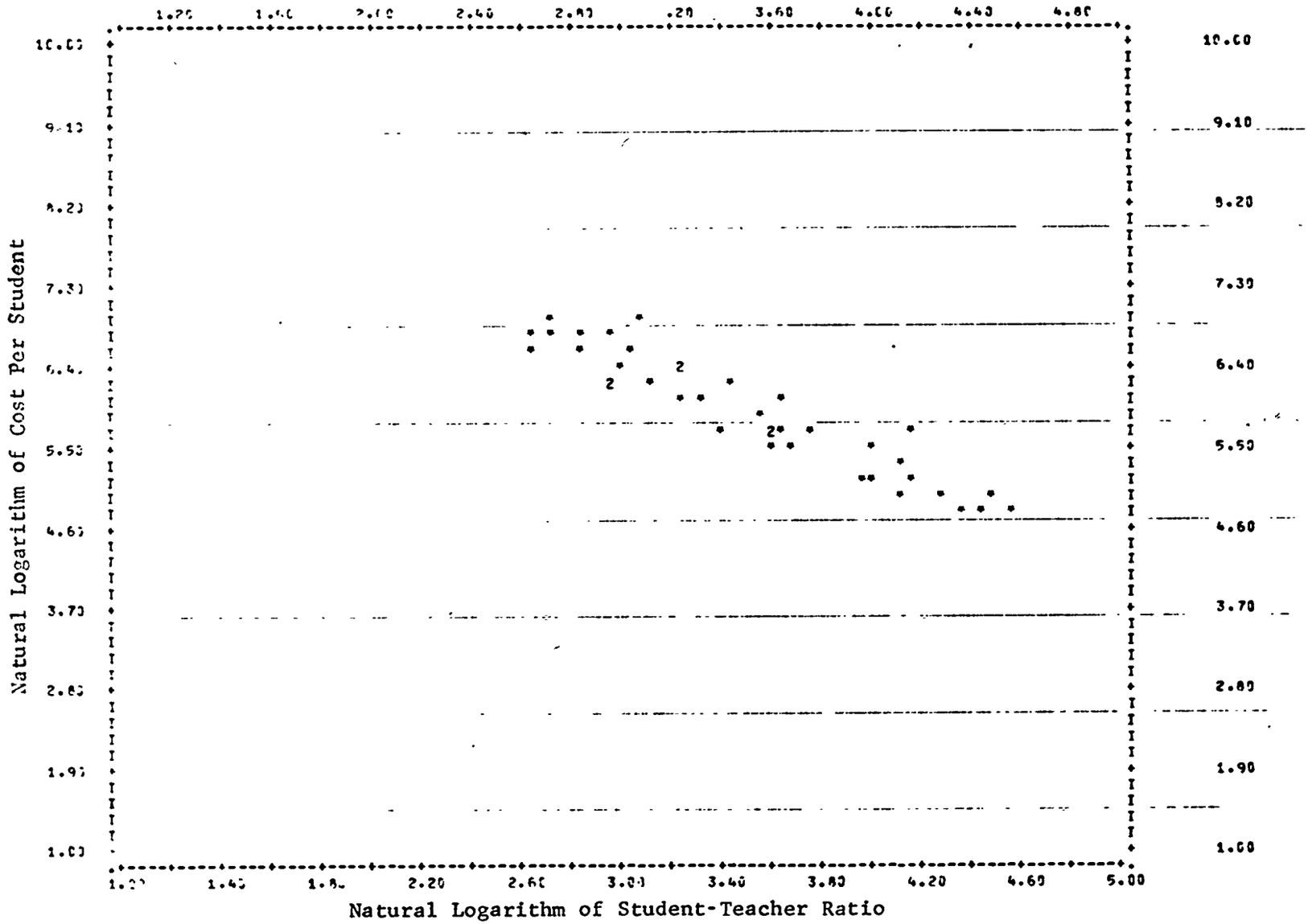

FIGURE 5. NATURAL LOGARITHM OF COST PER STUDENT VERSUS NATURAL LOGARITHM OF STUDENT-TEACHER RATIO FOR CO-OP PROGRAMS

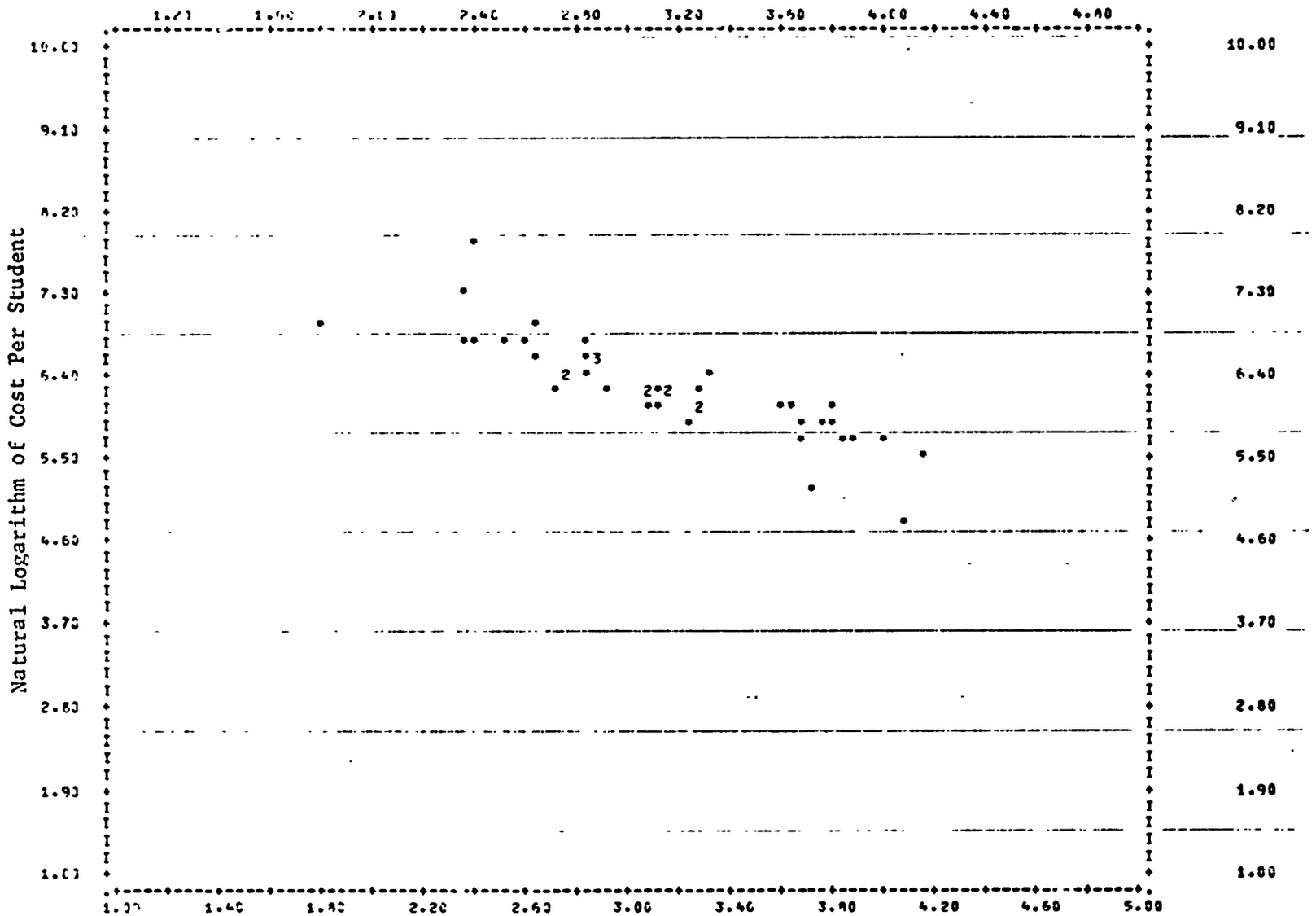

FIGURE 6. NATURAL LOGARITHM OF COST PER STUDENT VERSUS NATURAL LOGARITHM OF STUDENT-TEACHER RATIO FOR NON-CO-OP PROGRAMS

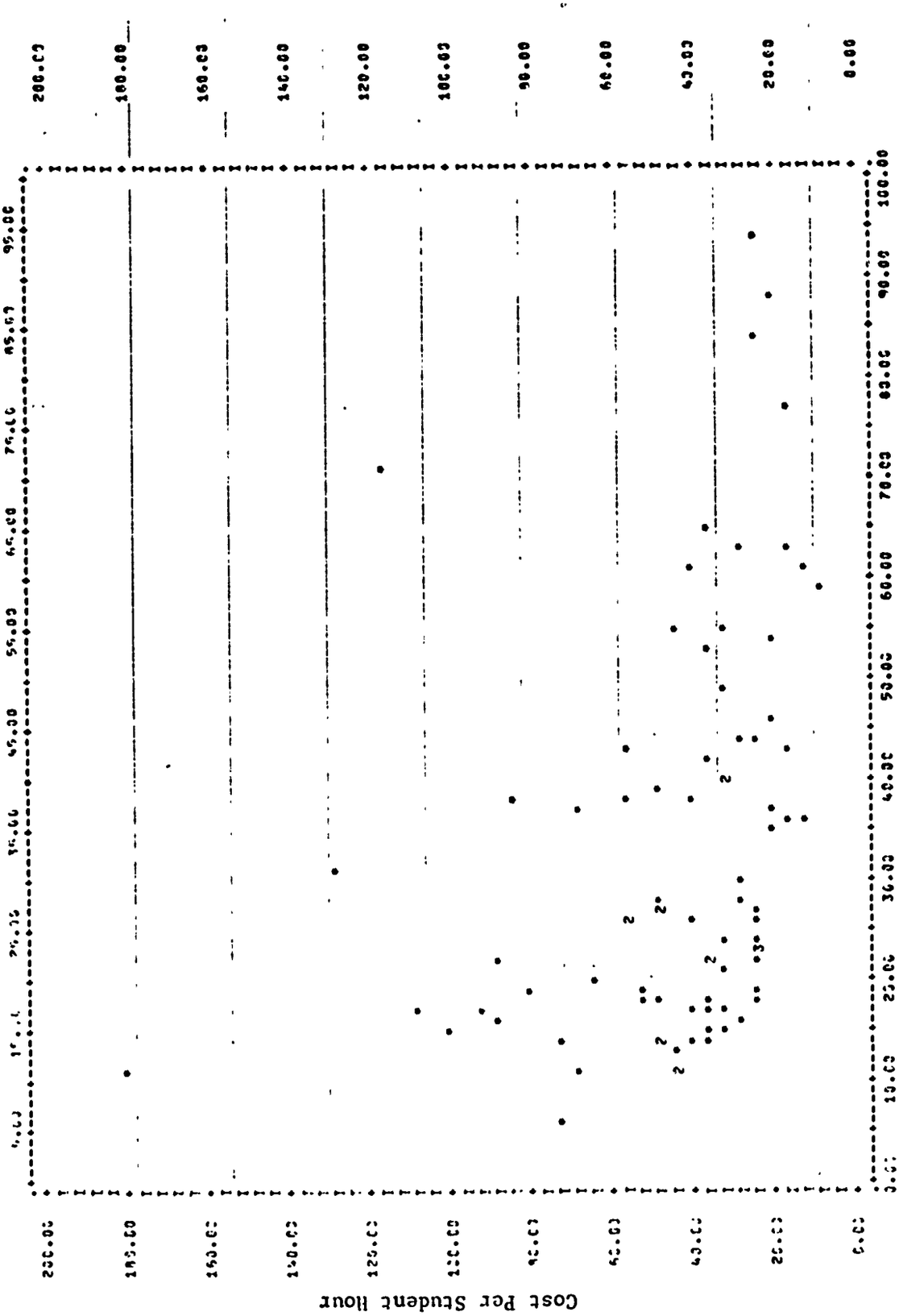

FIGURE 7. COST PER STUDENT HOUR VERSUS STUDENT-TEACHER RATIO FOR ALL PROGRAMS

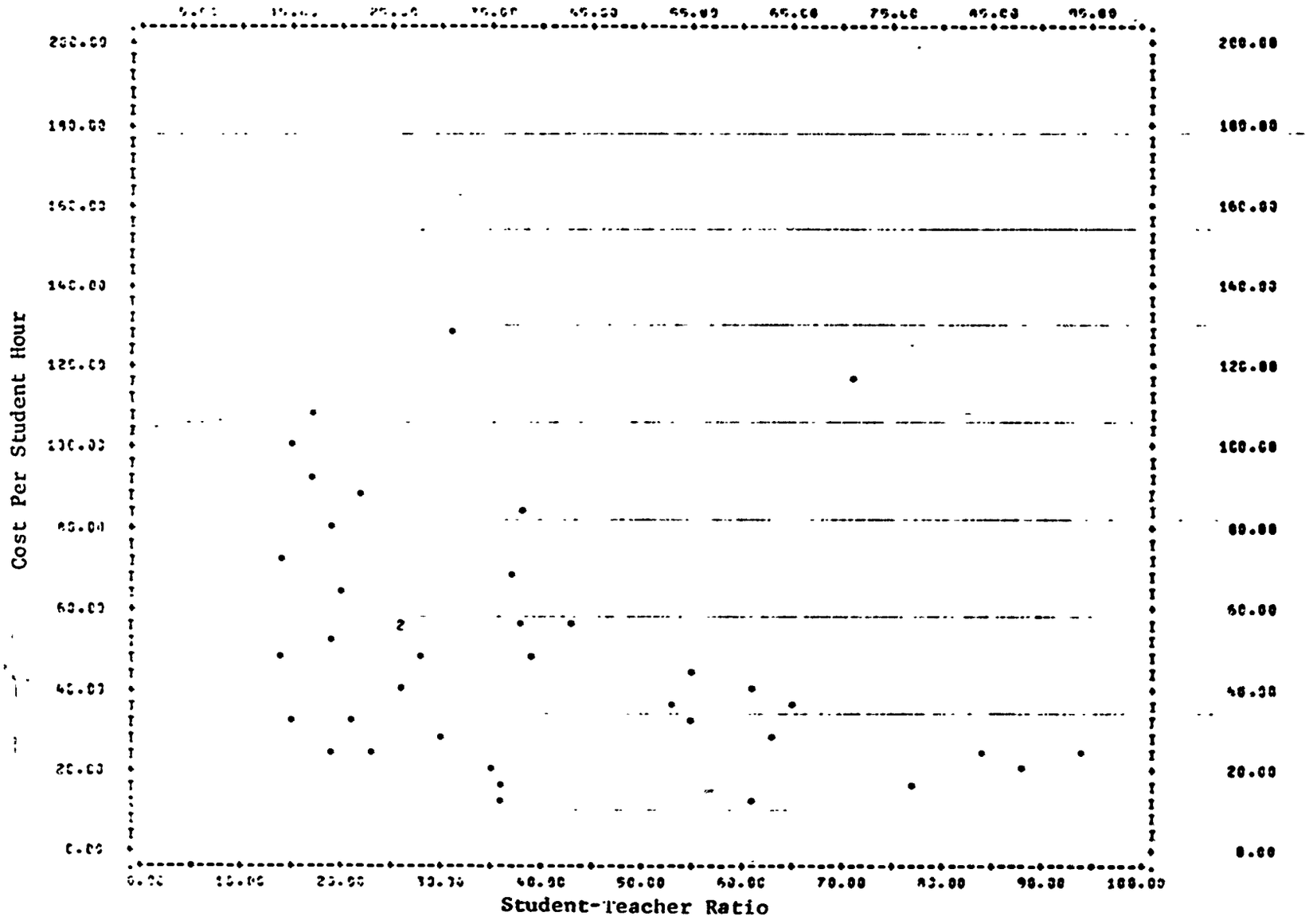

FIGURE 8. COST PER STUDENT HOUR VERSUS STUDENT-TEACHER RATIO FOR CO-OP PROGRAMS

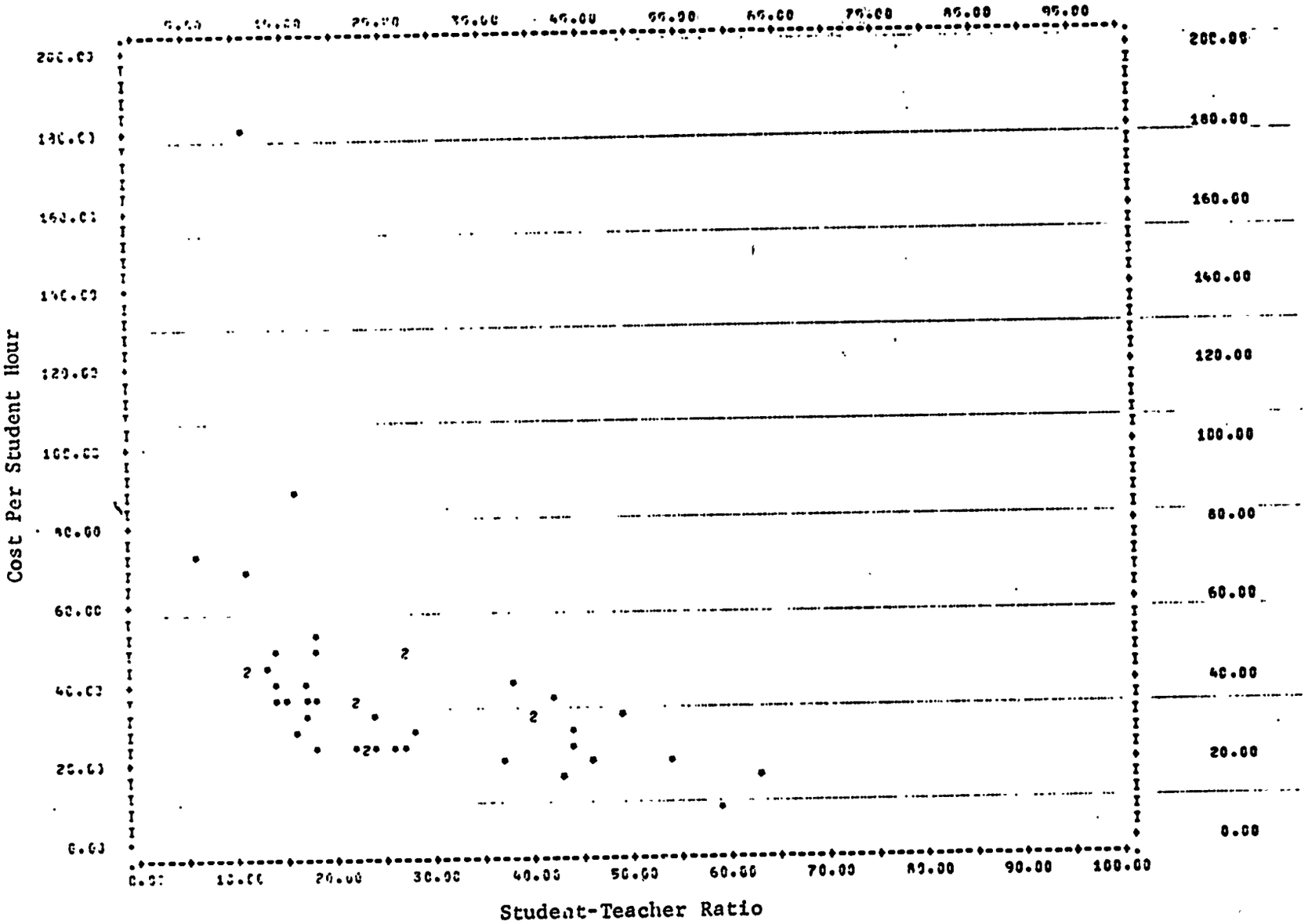

FIGURE 9. COST PER STUDENT HOUR VERSUS STUDENT-TEACHER RATIO FOR NON-CO-OP PROGRAMS

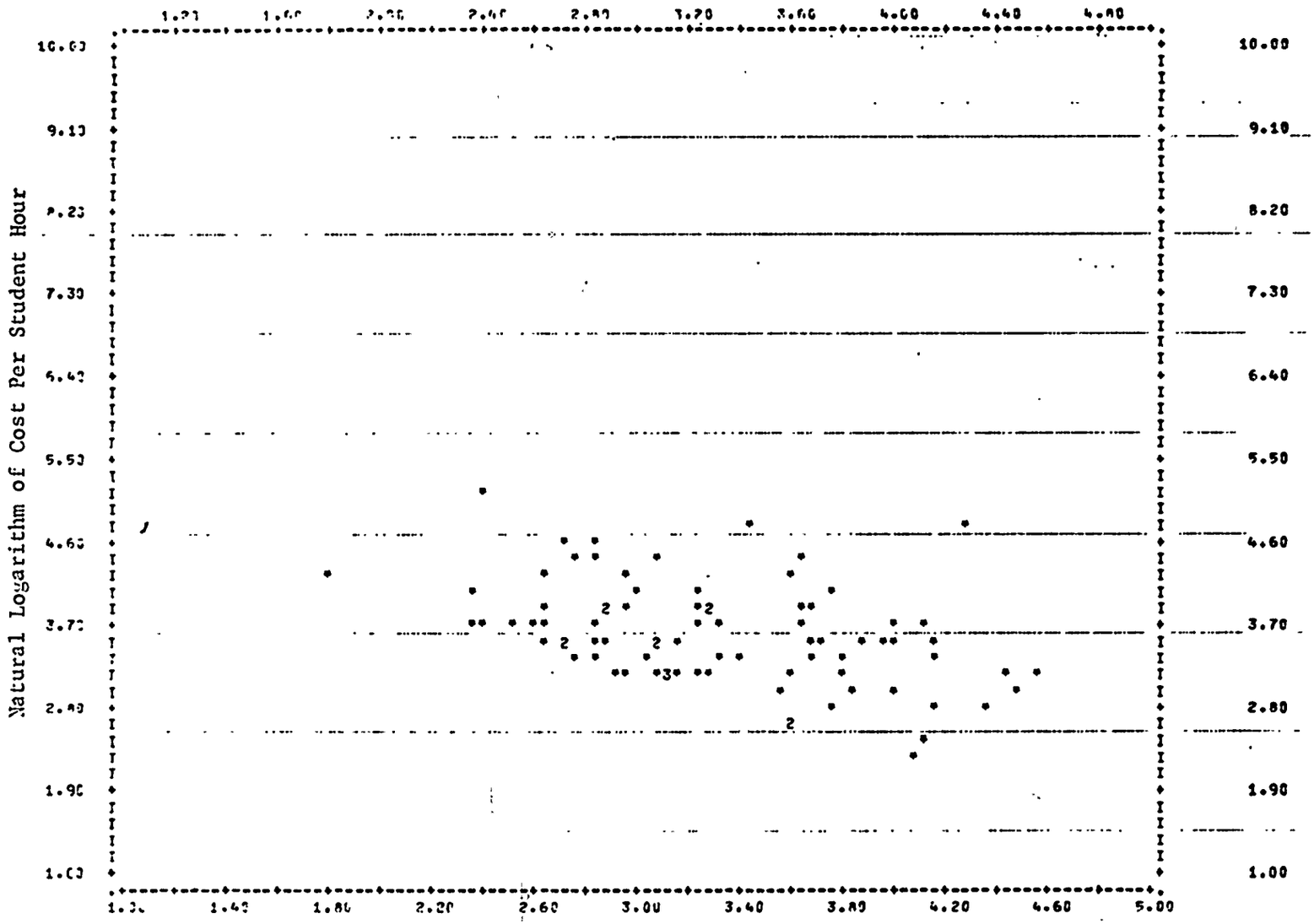

FIGURE 10. NATURAL LOGARITHM OF COST PER STUDENT HOUR VERSUS NATURAL LOGARITHM OF STUDENT-TEACHER RATIO FOR ALL PROGRAMS

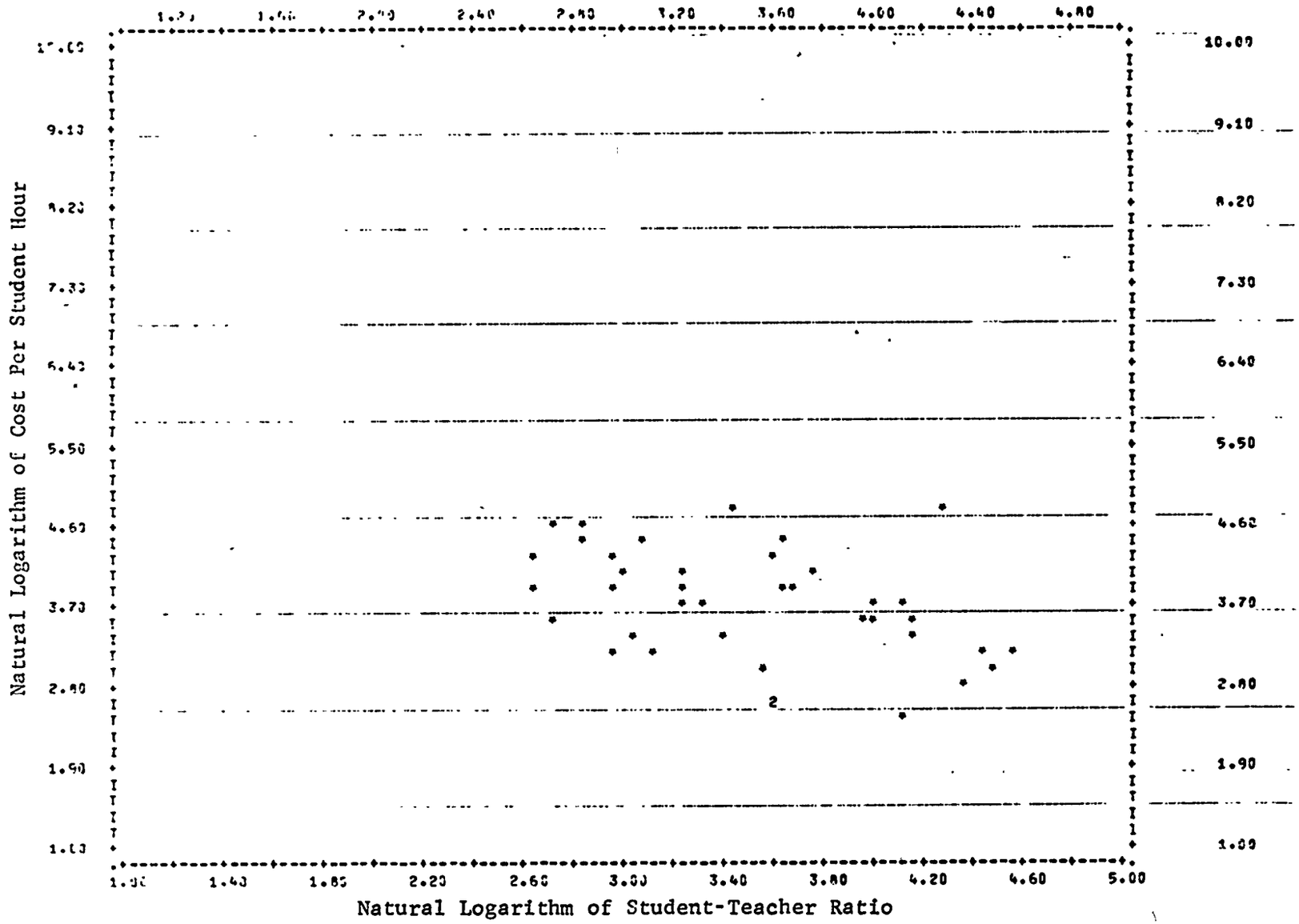

FIGURE 11. NATURAL LOGARITHM OF COST PER STUDENT HOUR VERSUS NATURAL LOGARITHM OF STUDENT-TEACHER RATIO FOR CO-OP PROGRAMS

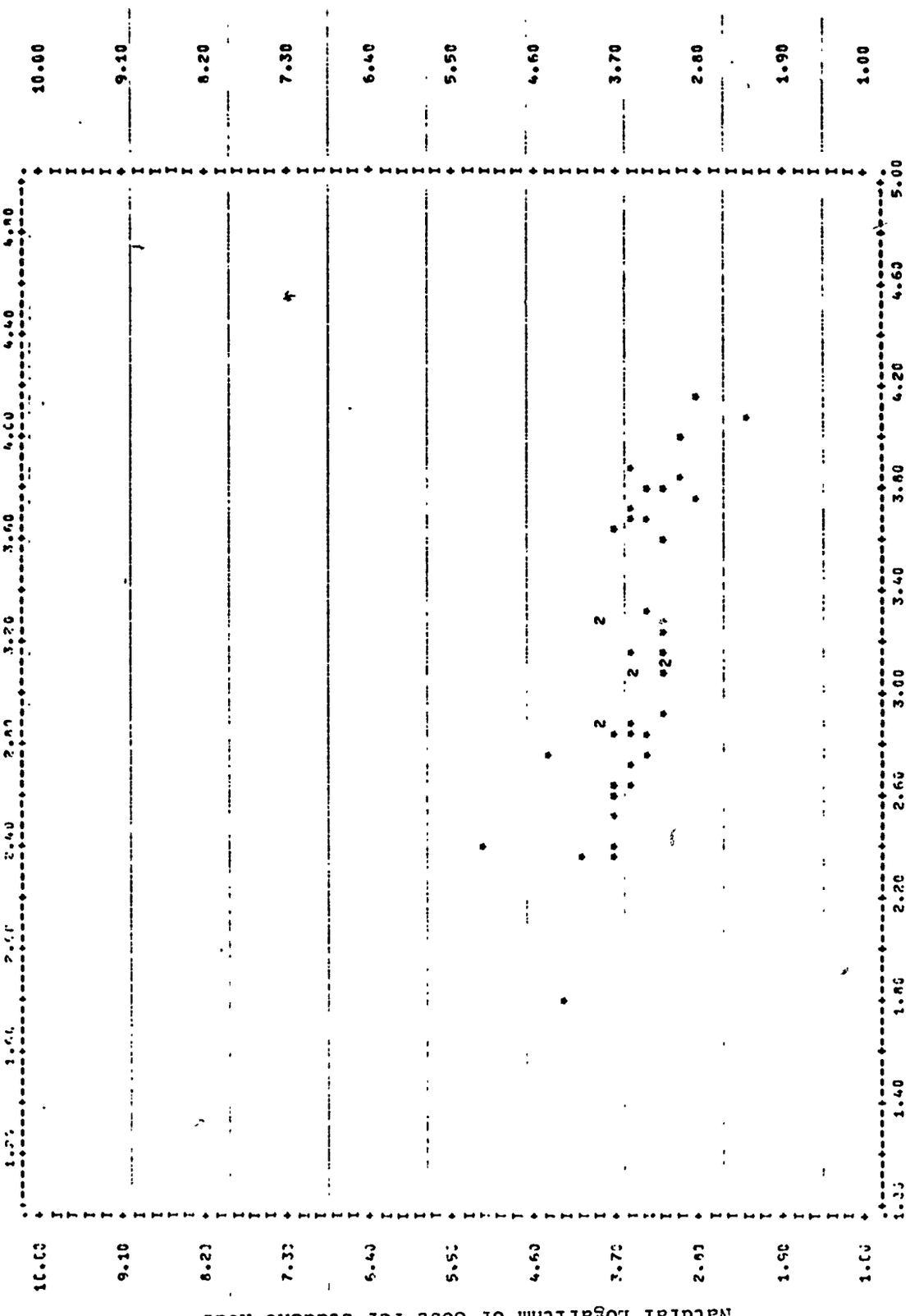

FIGURE 12. NATURAL LOGARITHM OF COST PER STUDENT HOUR VERSUS NATURAL LOGARITHM OF STUDENT-TEACHER RATIO FOR NON-CO-OP PROGRAMS

cost per student. The same table shows a cost difference of about $8 favoring non-co-op programs when the measure considered is cost per student hour. Because of the wide variability in the measures when considering programs at particular schools, the significance of these differences was questioned. A statistical test of significance for these two measures was conducted using Welch's two-sample test with unequal variances*. This test was modified to account for the fact that weighted means were being tested (number of students for the measure, cost per student; and number of student hours for the measure, cost per student hour). The modification was accomplished by using the Statistical Package for Social Scientists (SPSS).** Welch's test procedure yields an approximate test, not an exact one.

The test of significance for the mean cost per student ($355 for co-op programs versus $545 for non-co-op programs) yielded a test statistic of -3.19 with approximately 79 degrees of freedom. This result is statistically significant at the 90 percent confidence level. Although it appears that the differences are significant, the two measures yield different conclusions about the programs. Also it should be remembered that since the sample of schools and programs studied were not randomly selected, the application of statistical tests of significance which are based upon the assumption of random sampling is questionable. We feel it would be invalid to accept the results of the above tests as conclusive. However, since this study is an exploratory study directed toward determining the feasibility of conducting larger scale studies of the same nature, the tests have been included as illustrative models for future studies.

In an attempt to further understand the variability within the two cost measures being studied, further analysis of the scattergram plots in Figures 1 through 12 were conducted. Since the logarithmic relations appear linear, regression lines were fitted to these data. Figures 4, 5, and 6 respectively, presented the logarithmic plots for all programs, co-op programs, and non-co-op programs, for the cost

* Brownlee, K.A., Statistical Theory and Methodology in Science and Engineering, J. Wiley and Sons, Inc., New York, 1960, pp 235-239.

** Nie, N., Bent, D.H., Hull, C.H., SPSS, Statistical Package for the Social Sciences, McGraw-Hill Book Co., N.Y., 1970, Update Version 5.0, December 15, 1972.

measure, cost per student. The results of the regression analyses for this cost measure are summarized in Table 17. For the regression on all programs, the independent variable, natural log of student-teacher ratio, accounted for 85 percent of the variation in the dependent variable. For co-op programs the independent variable accounted for 92 percent of the variation, and for non-co-op programs, it accounted for 97 percent of the variation. In all cases, this is a statistically significant result well beyond the 99.9 percent confidence limit.

The plot of these regression lines is shown in Figure 13. The range for the independent variable covered by the regressions is (1.80, 4.60). This is the area shown on the the graph in Figure 13 since any extrapolation outside this range is not valid. For this range, the plot appears to show no significant difference in the cost per student for the two methods--co-op versus non-co-op. A statistical test can be conducted on this question.* No such test was run on this data for the reason mentioned earlier, namely the fact that the sample of programs selected for the study was not selected randomly.

Table 18 summarizes the regression analyses for the cost measure, cost per student hour, displayed in Figures 10, 11, and 12. The amount of variation in the dependent variable which is explained by the dependent variable ranges from 20 percent to 48 percent. This is a dramatic reduction from the other cost measured. It is related to the fact that the plots for this measure, shown in Figures 10, 11, and 12, showed much more scatter than the corresponding plots for the other cost measure. Nevertheless the regression results appear significant above the 99.7 percent confidence level.

The plot of the regression lines for the cost measure, cost per student hour are shown in Figure 14. The lines are not as close as those shown in Figure 13. No tests of significance were conducted for the reasons stated earlier.

This analysis has shown there are several ways of displaying the cost information. The summarized displays contained in this section give the reader an overall appreciation of the various methods of display.

* Brownlee, K.A., Statistical Theory and Methodology in Science and Engineering, J. Wiley and Sons, Inc., New York, 1960, pp 288-290.

TABLE 17. REGRESSION ANALYSIS ON COST PER STUDENT

Data Base	Regression Line*	Correlation (R)	R^2	Significance Level
All Programs	Y=9.43-0.98X	-0.92	0.85	0.00001
Co-op Programs	Y=9.85-1.10X	-0.96	0.92	0.00001
Non-Co-op Programs	Y=9.07-0.87X	-0.88	0.77	0.00001

* Y = Natural logarithm of Cost Per Student
X = Natural logarithm of Student-Teacher Ratio

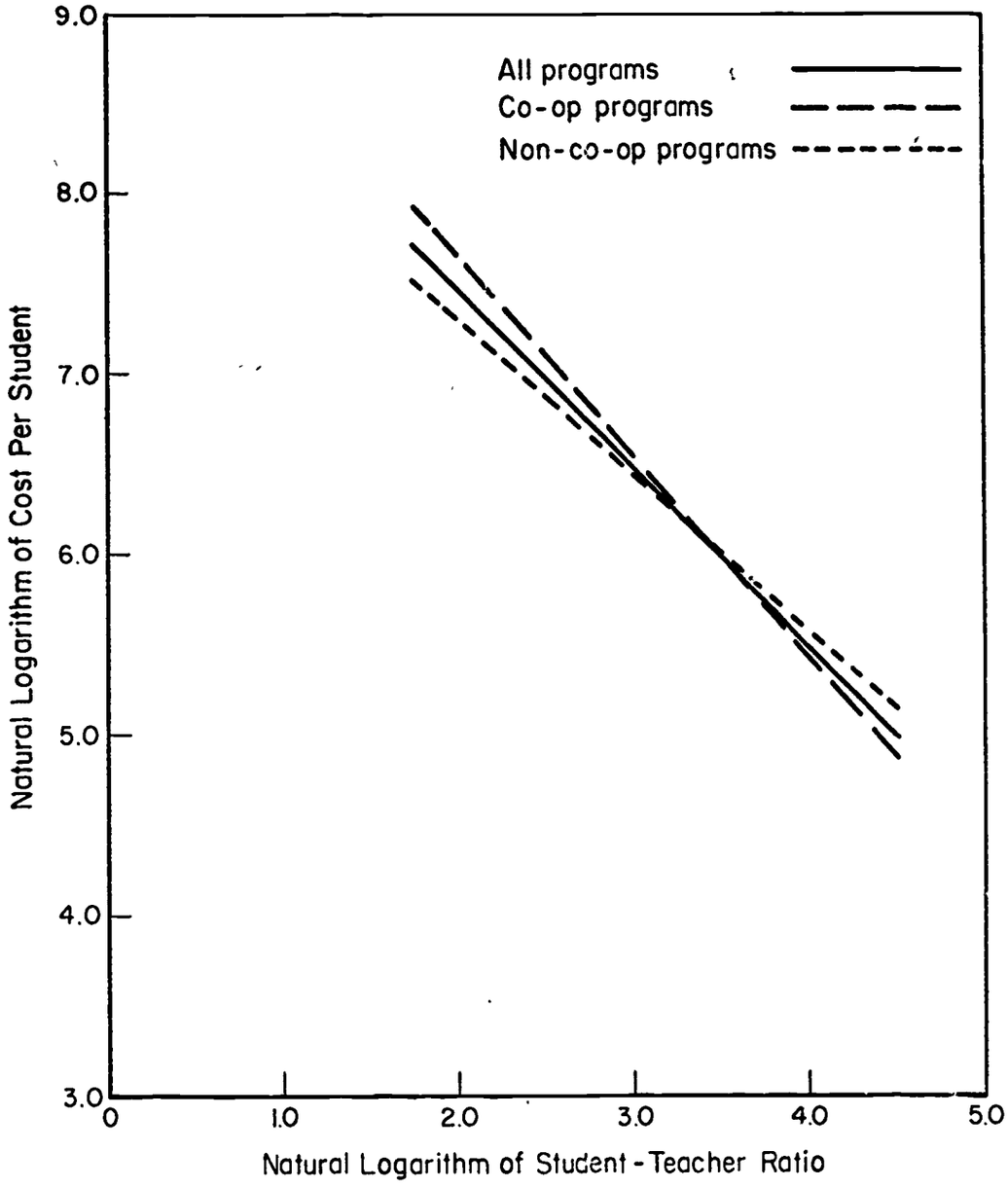

FIGURE 13. PLOT OF REGRESSION LINES FOR COST PER STUDENT

TABLE 18. REGRESSION ANALYSIS ON COST PER STUDENT HOUR

Data Base	Regression Line*	Correlation (R)	R^2	Significance Level
All Programs	Y=5.05-0.42X	-0.45	0.20	0.00001
Co-op Programs	Y=5.45-0.47X	-0.45	0.20	0.00223
Non-Co-op Programs	Y=5.41-0.59X	-0.67	0.48	0.00001

* Y = Natural Logarithm of Cost Per Student Hour
  X = Natural Logarithm of Student-Teacher Ratio

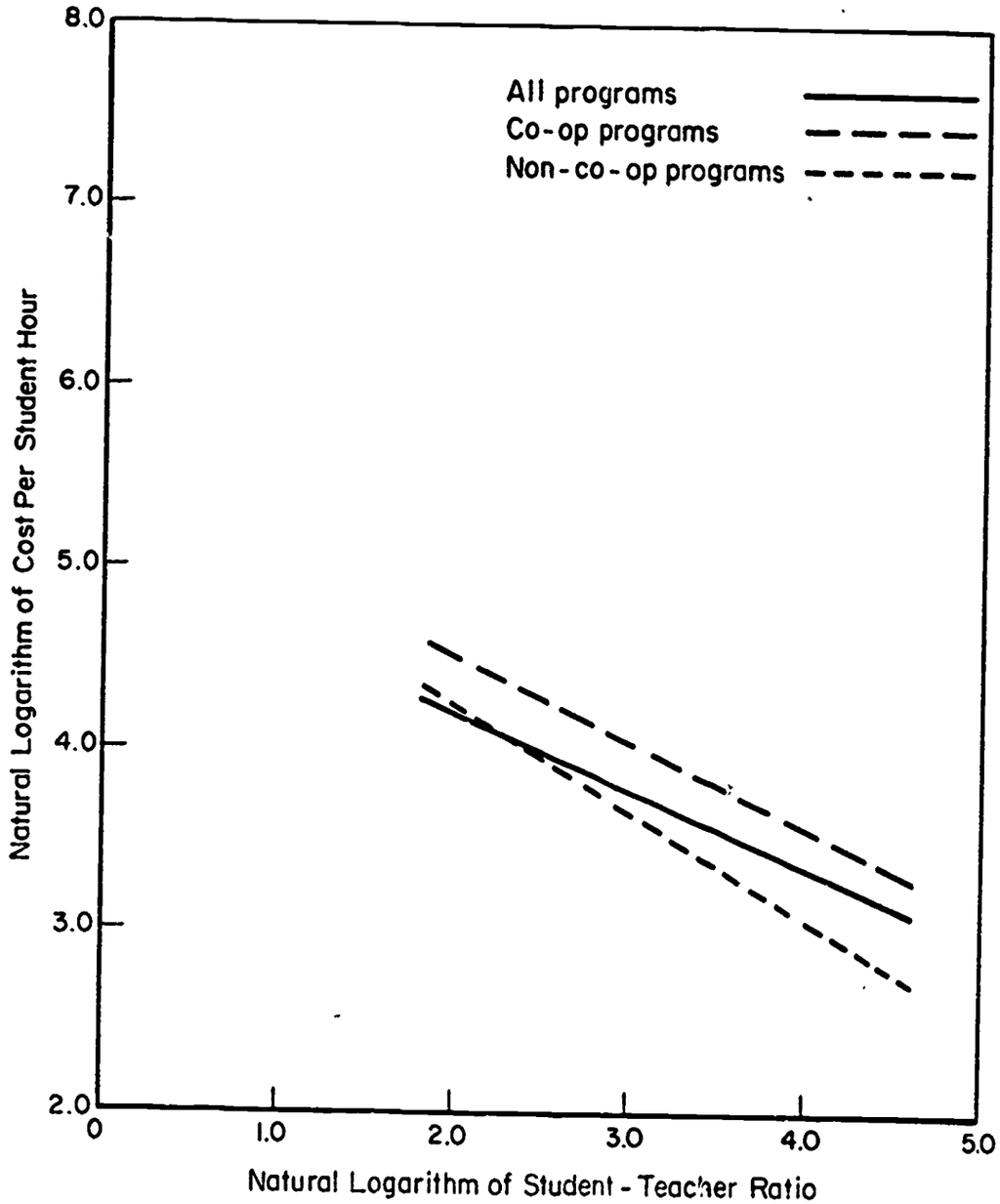

FIGURE 14. PLOT OF REGRESSION LINES FOR COST PER STUDENT HOUR

In a sense, the costs calculated represent the extra cost for providing that proportion of the education that is vocational. We did not collect information on the cost of non-vocational training. However, the measures that are based on vocational training can be used for comparison purposes. For the programs studied, the measures (especially after removing variation due to the student-teacher ratio), show little difference in costs between the two methods--co-op versus non-co-op. The analysis has confirmed the well-known fact that direct instructional costs is by far the most significant cost element.

In summarizing the cost data, questions were developed on some of the raw data provided by the schools. Several of these necessitated telephone conversations with the schools for clarification. (For example, teachers' salaries in some cases were not originally reported as full-time equivalents, and had to be modified after further investigation.) Once again, recommendations for improving the data collection in this respect are discussed later in the report.

For the most part, the data collection forms used for the cost analysis are adequate for further studies with larger numbers of school districts. The detail is about right for comparison purposes. The school districts were able to provide the cost information, by program, at this level. It represents a good compromise between the level of detail needed for analysis purposes, and the level of detail to which a school district can readily respond.

We feel that both measures, cost per student hour and cost per student, are valid measures for a cost analysis. Cost per student is a more commonly accepted measure and worked well for the data collected for this study.

However, cost per student hour should not be discarded although it did not function as well for this particular set of data. We feel that it still is a valid measure which helps to normalize the program costs for a comparison of co-op versus non-co-op programs. In effect, this measure is based on the number of teacher-student contact hours in vocational learning experiences. We are not presupposing that the number of contact hours is a measure of effectiveness.

We are simply trying to point out that the nature of the method--co-op versus non-co-op is such that there is a different proportion of contact hours in vocational training. Notice that we have not included the on-the-job hours that the co-op student spends in non-coordinated activity.* We realize that this is a part of the learning experience, but we have no way of equating those hours to teacher-student vocational training. In actuality, the school system is not paying for the majority of hours that the student spends in on-the-job experiences. If the school system can use the co-op program to make more effective use of the direct instructional resources, then this should become evident by comparing the two methods on the basis of our two cost measures.

Effectiveness Analysis

This section follows the same format as the preceding section on cost analysis. In the first subsection, the methodology for developing the effectiveness measures is described. Following this, a summary of the results of the effectiveness analysis is presented. Finally, the interpretations of the results of the effectiveness analysis are provided.

Methodology

The data used to develop effectiveness measures were obtained from the information reported on FORM E, Vocational Program Descriptive and Effectiveness Data, Student Follow-Up Data. A copy of this form appears in Appendix A of this report.

Ten effectiveness measures have been developed from information collected from the schools. The purpose of the measures is to serve as indicators of differences among programs, and particularly between co-op and non-co-op programs on an aggregate basis. The measures are basically averages and percentages which can be obtained directly from tabulations and summaries of the information reported on FORM E.

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* Note--For co-op programs the time spent by the teacher coordinating the on-the-job learning experiences is included. Refer to the equation on page 49.

In the process of generating these tabulations and summaries, the problem of missing data arose. The approach to this problem was to estimate the effectiveness measures on that portion of the data which was available and to use these estimates as representative measures for the various classes of programs. This seemed to be the most appropriate course of action, since this was an exploratory study which did not allow for any follow-up effort to remedy the missing-data problem. Even so, the amount of data available was sizable as will be evidenced in the discussion of the analysis results. Further improvements to the data collection form and data collection procedures to alleviate the missing data problems for any further studies are recommended in a later section of the report.

The ten measures of effectiveness based on school-provided information are the following:

(1) Percentage of students graduating

(2) Percentage distribution of employment status

(3) Mean entry wage rate per hour

(4) Mean most recent wage rate per hour

(5) Percentage distribution of location of initial employment

(6) Percentage distribution of location of most recent employment

(7) Percentage of graduates admitted to formal apprenticeship programs

(8) Percentage of graduates with two or less employers

(9) Mean length of longest employment (months)

(10) Mean number of weeks after graduation until obtaining full-time employment.

Other data were collected on FORM E with the intention of developing further effectiveness measures for the study, but due to the lack of standardization in response, such data were not amenable to analysis. Recommendations for improving the data base for this additional information are discussed later.

In calculating the effectiveness-measure estimates, it should be remembered that the data base consists of a sample of students from an individual program, and not necessarily the entire population of students within the program. Where the number of students in a program was small, however, the respondent tended to supply available data for all students. Since the form allows for a maximum of 25 students, in cases where a program had more than 25 students, data were provided on up to 25 students within the particular progra. with one exception for which data were reported on 31 students. The net effect of this collection process is that the data available for the effectiveness analysis constitute a representative sampling of data on students within the programs and do not constitute a survey of the complete student population in the programs. A total of 1376 students formed the sample for which all or part of the data were reported.

The first measure, Percentage of Students Graduating, is intended to provide a measure of the success of the individual program types being studied. It was calculated as the ratio of the number of students graduated to the total number of students either graduated or not graduated. No inferences were made concerning missing data, and missing data were excluded from the calculation. No data were available for 9 percent of the students on this measure.

The second measure, Percentage Distribution of Employment Status, can be used to measure the effectiveness or ineffectiveness of the various program types. The data were classified into one of five categories:

(1) Presently employed
(2) Continued education after graduation
(3) Entered military services
(4) Unavailable for employment
(5) Presently unemployed.

The graduates who continued their education after high school include those enrolled in a four year college, a full-time two year community or junior college, a technical school or other post-secondary school.

The graduates unavailable for employment include those with family responsibilities or other reasons for not being available. Because of difficulties with the form, it was necessary in some cases to infer the status of graduates who are either employed or unemployed. The respondents were instructed to indicate unemployed graduates by entering the number of weeks unemployed. They did not always to so. Yet, it was evident that the graduate was unemployed since the respondent completed all items on the graduate except information on most recent employment. In such cases it was inferred that the graduate was currently unemployed. The third page of FORM E was to be completed only for those graduates currently employed. Whenever the respondents provided complete information on most recent employment, it was assumed the graduate was currently employed. If any question existed as to the interpretation of employment status for a particular graduate, his status was considered as missing data. We feel this results in a conservative estimate for employment status. Recommendations for improving FORM E with respect to this information are presented later.

With the classification of the data into the five employment status categories, percentages were calculated for each category as the ratio of the number of graduates in the category to the total number for all five categories. Missing data were excluded and represent about 17 percent of the data.

The third measure of effectiveness, Mean Entry Wage Rate Per Hour was calculated as an arithmetic average for each program, as was the fourth measure, Mean Most Recent Wage Rate Per Hour. The two measures together represent an index of the progress of graduates from particular programs for comparison purposes. Data for a particular program was reported according to one of three follow-up periods--3 to 6 months, 7 to 12 months, or 13 to 18 months. Since most of the responses were based upon a 13 to 18 month follow-up period, attention was focused on this set of data, and the few cases for the other follow-up periods were excluded. This is so only for the Most Recent

Wage-Rate Per Hour and not for the Entry Wage Rate Per Hour. Missing data for the Entry Wage Rate Per Hour amounted to about 61 percent of the students, and for Most Recent Wage Rate Per Hour about 76 percent. An additional 4 percent of data based upon shorter follow-up periods was excluded also. It should be remembered however, that a substantial part of these missing data is due to students not being available for employment. Nevertheless, this appears to be a difficult data item to collect.

The fifth and sixth measures of effectiveness deal with the location of initial and most recent employment, respectively. These measures are intended to indicate in part the degree to which the vocational programs serve the employment needs of the communities. Percentages were calculated as the ratio of the number of graduates in one of three categories to the total number of graduates for which data were available. The three categories are:

(1) Employed within the local labor market

(2) Employed outside the local labor market but within the state

(3) Employed outside the state.

For initial employment location, data were available on about 42 percent of the graduates and for most recent employment location, data were available for about 39 percent of the graduates. Of course, some of the "missing" data in fact are not missing but represent graduates who did not enter the labor market for some reason or were unemployed.

The seventh measure, Percentage of Graduates Admitted to a Formal Apprenticeship Program, was calculated as the ratio of the number of positive responses to the total number of positive and negative responses. Excluding missing data from the calculation resulted in data being available for about 34 percent of the graduates.

The eighth measure of effectiveness was the Percentage of Graduates with Two or Less Employers Since Graduation. It was calculated as the ratio of the number of graduates for which two or less employers were reported, to the total number of graduates for which data were

available, excluding missing data. Data were available for approximately 60 percent of the graduates. Missing data again includes graduates not available for employment.

The ninth measure of effectiveness, Mean Length of Longest Employment was calculated as an arithmetic average, excluding missing data. Once again, since the majority of the data were reported for a 13 to 18 month follow-up period, only data for this period were included, to the exclusion of data for the other follow-up periods, and missing data. The estimates to be presented represent about 29 percent of the graduates. Missing data here also includes graduates not available for employment.

The tenth and final measure, Mean Weeks After Graduation Until Full Time Employment, was calculated as an arithmetic average, excluding missing data. Data were available for approximately 40 percent of the graduates. The missing data and graduates not available for employment represent the 60 percent of unavailable data.

In all cases where arithmetic averages were calculated, standard deviations were also calculated to provide an indication of the spread or variation in the data. Standard statistical formulas were employed for these calculations. For random samples of approximately 40 or more observations, the arithmetic average plus or minus two times the standard deviation, represent approximately 95 percent confidence limits for a particular observation.

Results of the Effectiveness Analysis Based on School-Provided Data

Table 19 presents a summary of the results of the effectiveness analysis for each of the ten effectiveness measures for the study. These results are presented for twelve of the 14 vocational program areas included in the study, for each of the two aggregate program types (co-op and non-co-op) and for all programs. Data were not reported by the school districts for two of the non-co-op program areas, Special Office Training, and Welding, and these two program areas consequently do not

TABLE 19. SUMMARY OF RESULTS OF EFFECTIVENESS DATA COLLECTED ON FORM E

Effectiveness Measures		Co-op						Non-co-op								
		Co-op Dist. Educ.	Div. Co-op Trg.	Co-op Office Educ.	Trade and Ind.	Co-op Work Exp.	All Co-op Programs	Auto Mech.	Auto Body	Elect.	Drafting	Mach. Trades	Gen. Office	Steno.	All Non-co-op Programs	All Programs
1. Percentage of students graduating		97.6	97.5	100.0	97.2	100.0	98.2	97.3	75.0	98.0	93.7	94.7	100.0	100.0	97.0	97.9
2. Employment status (percentage distribution)	- Employed	46.9	43.3	58.9	37.1	0.0	46.7	44.4	85.7	28.9	37.0	45.7	44.1	37.2	40.6	44.1
	- Continued education	27.5	23.6	22.1	37.1	64.0	27.1	39.7	0.0	48.4	38.9	28.6	33.3	46.5	37.5	31.6
	- Entered military service	11.5	23.6	1.2	14.3	28.0	12.6	12.7	14.3	15.5	20.4	21.9	1.0	2.3	12.5	12.6
	- Unavailable for employment	10.3	4.4	9.2	8.6	8.0	8.5	1.6	0.0	0.0	0.0	1.0	19.8	14.0	6.3	7.5
	- Unemployed	3.8	5.1	8.6	2.9	0.0	5.1	1.6	0.0	7.2	3.7	2.8	1.8	0.0	3.1	4.2
	- (Number of graduates)	(262)	(157)	(163)	(35)	(25)	(642)	(63)	(7)	(97)	(54)	(105)	(111)	(43)	(480)	(1122)
3. Entry wage rate per hour (dollars per hour)	- Average	1.95	2.17	1.69	2.04	--	1.92	2.23	2.07	2.54	2.24	2.60	1.81	2.00	2.28	2.03
	- (Standard deviation)	(0.56)	(0.58)	(0.16)	(0.61)	--	(0.51)	(0.22)	(0.21)	(0.63)	(0.44)	(0.54)	(0.27)	(0.00)	(0.56)	(0.55)
	- (Number of graduates)	(144)	(85)	(120)	(23)	--	(372)	(14)	(6)	(30)	(17)	(50)	(42)	(3)	(162)	(534)
4. Most recent wage rate per hour (13-18 month follow-up data only) (dollars per hour)	- Average	2.66	2.60	2.20	3.33	--	2.54	2.95	3.02	2.68	2.89	3.19	2.08	2.44	2.73	2.61
	- (Standard deviation)	(0.91)	(0.54)	(0.32)	(1.00)	--	(0.76)	(0.48)	(0.78)	(0.43)	(0.68)	(0.63)	(0.30)	(0.00)	(0.66)	(0.73)
	- (Number of graduates)	(62)	(28)	(64)	(15)	--	(169)	(11)	(6)	(21)	(10)	(33)	(30)	(3)	(114)	(283)
5. Location of initial employment (percentage distribution) (Co-op = 360 graduates; non-co-op = 215 graduates)	- Within local market	91.8	98.7	97.3	88.5	--	94.7	100.0	100.0	95.2	100.0	95.7	92.7	93.8	95.8	95.1
	- Within state	6.1	1.3	0.0	7.7	--	3.3	0.0	0.0	4.8	0.0	4.3	7.3	0.0	3.7	3.5
	- Outside of state	2.1	0.0	2.7	3.8	--	2.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.5	1.4
6. Location of most recent employment (percentage distribution) (Co-op = 341 graduates; non-co-op = 194 graduates)	- Within local market	86.3	95.7	91.2	87.0	--	89.7	100.0	100.0	86.7	90.5	94.2	86.0	93.8	91.8	90.4
	- Within state	12.3	4.3	3.9	13.0	--	8.2	0.0	0.0	13.3	9.5	1.9	14.0	0.0	6.7	7.7
	- Outside of state	1.4	0.0	4.9	0.0	--	2.1	0.0	0.0	0.0	0.0	3.9	0.0	6.2	1.5	1.9
7. Percentage of graduates admitted to formal apprenticeship program		16.5	4.8	0.0	5.9	--	8.9	12.0	--	12.0	17.6	11.3	3.6	0.0	8.9	8.9
8. Percentage of graduates with two or less employers (13-18 month follow-up data only)	- Percentage	77.1	82.2	86.5	89.5	--	82.4	45.5	100.0	90.9	100.0	65.7	82.1	100.0	79.5	81.4
	- (Number of graduates)	(96)	(45)	(96)	(19)	--	(256)	(11)	(2)	(22)	(10)	(35)	(39)	(13)	(132)	(388)
9. Length of longest employment (months) (13-18 month follow-up data only)	- Average	12.6	13.5	13.6	9.7	--	12.9	13.7	12.7	15.0	14.8	11.7	14.6	16.3	14.0	13.3
	- (Standard deviation)	(4.7)	(4.0)	(4.6)	(4.5)	--	(4.6)	(4.7)	(3.7)	(3.5)	(2.7)	(4.6)	(3.7)	(2.9)	(4.0)	(4.4)
	- (Number of graduates)	(100)	(47)	(94)	(20)	--	(261)	(11)	(6)	(26)	(10)	(35)	(39)	(14)	(141)	(402)
10. Weeks after graduation until full-time employment	- Average	2.5	0.6	2.1	0.4	--	1.7	0.9	5.0	4.2	4.5	2.6	3.5	1.0	3.2	2.3
	- (Standard deviation)	(7.9)	(3.3)	(7.4)	(2.1)	--	(6.6)	(1.4)	(2.9)	(14.7)	(8.4)	(3.2)	(9.3)	(0.0)	(9.0)	(7.6)
	- (Number of graduates)	(133)	(93)	(96)	(23)	--	(345)	(20)	(6)	(47)	(22)	(44)	(56)	(16)	(211)	(556)

appear in the Table. Blank entries in the table indicate additional cases where data were not reported for a particular effectiveness measure. Wherever it was felt that the number of graduates upon which a measure was estimated would be informative, that information was included in the table. The interpretation of these results is presented in the following section.

Interpretation of Effectiveness Analysis Based on School-Provided Data

In Table 19, the first effectiveness measure, Percentage of Students Graduating, ranges from a low of 75 percent for the non-co-op Auto Body Program to a high of 100 percent for several program areas. The low was based upon data for only 8 students which is too small a sample to indicate significance. The average percentage for co-op programs does not appear to be significantly different from that for non-co-op programs, and it can be concluded that the methods do not differ significantly if their effectiveness is measured in this manner.

When considering the second effectiveness measure, Percentage Distribution of Employment Status, several of the classifications are of particular interest. The first of these is the percentage of graduates currently employed. In Table 19, for co-op programs, 46.7 percent of the graduates are currently employed, and for non-co-op programs, 40.6 percent are currently employed. If a statistical test of significance (difference in two proportions)* is conducted, a test statistic of 2.04 results, which is significant for a test at the 95 percent confidence level. Consequently for the program areas studied, the difference in percentage of graduates employed is significant in favor of graduates of co-op programs. However, further examination of this measure is warranted. If the percentage of graduates unemployed is considered, the co-op programs display a percentage of 5.1, while the non-co-op programs show a percentage of 3.1. Using the same test, a test statistic of 1.74 results which is not significant at

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* Duncan, A. J., Quality Control and Industrial Statistics, R. D. Irwin, Inc., 1959, pp 467-469.

the 95 percent confidence level. Consequently, although a significantly greater percentage of graduates of co-op programs are currently employed, there is no significant difference in the rates of unemployed graduates. This suggests that a greater proportion of the graduates of non-co-op programs are engaged in other activities which result in their being unavailable for employment. These activities include continuing their education, military service, family responsibilities, etc.

The third and fourth measures of effectiveness in Table 19 together provide another means of comparing the two methods. Of interest here might be the increase in wage rate based on the follow-up period of 13 to 18 months. Table 20 summarizes this information for the present study. The average wage rate increase for graduates of co-op programs based on this follow-up period was $0.62 per hour. For graduates of non-co-op programs, the average wage rate increase was $0.45 per hour. However, the graduates of co-op programs had an average entry wage rate lower than those for non-co-op programs, so that even with the larger increase, these same graduates had a lower average most recent wage rate. The most recent wage rates differ by $0.19 per hour. The Aspin-Welch test of significance* conducted on these most recent wage rates yields a test statistic of 2.23 which indicates that the graduates of the non-co-op programs have significantly higher wage rates on the average based on a 13 to 18 month follow-up period. However, since missing data amounted to approximately 61 percent for Entry Wage Rate, and almost 80 percent for Most Recent Wage Rate, the generality of this conclusion is questionable. It is important to consider the occupational areas that are included in non-co-op programs versus co-op programs. For example, the labor market conditions are certainly different for auto mechanics versus sales clerks.

The fifth and sixth measures of effectiveness in Table 19 offer a comparison of vocational programs in terms of the degree to which the programs serve the employment needs of the communities. There seems to be little difference between co-op programs and non-co-op programs on

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* Ibid., pp 476-477.

TABLE 20. COMPARISON OF WAGE RATES BASED ON A FOLLOW-UP PERIOD OF 13 to 18 MONTHS

Program	Average Most Recent Wage Rate ($/hr.)	Average Entry Wage Rate ($/hr.)	Average Increase in Wage Rate ($/hr.)
CO-OP			
Distributive Education	$2.66	$1.95	$0.71
Diversified Cooperative Training	2.60	2.17	0.43
Cooperative Office Education	2.20	1.69	0.51
Trade and Industry	3.33	2.04	1.29
Cooperative Work Experience	-	-	-
All Co-op Programs	2.54	1.92	0.62
NON-CO-OP			
Auto Mechanics	$2.95	$2.22	$0.73
Auto Body	3.02	2.07	0.95
Electricity/Electronics	2.68	2.54	(decrease)
Drafting	2.89	2.24	0.65
Machine Trades	3.19	2.60	0.59
General Office	2.08	1.81	0.27
Steno	2.44	2.00	0.44
All Non-co-op Programs	2.73	2.28	0.45

these measures. However, it is interesting to note the change for all programs after the follow-up period. Initially, 95 percent of the employed students in all programs obtained employment within the local labor market, and at the time of the follow-up this percentage dropped to about 90 percent. A test of significance* on this difference yields a test statistic of 3.03 which is significant at the 95 percent confidence level. Consequently, although there appears to be no difference between co-op and non-co-op programs in terms of serving the needs of the communities, the percentage of employed graduates remaining in the local labor market dropped significantly during the follow-up period. Of course the local labor market conditions may have had more of an effect than the schooling the graduates received.

The seventh measure in Table 19, Percentage of Graduates Admitted to a Formal Apprenticeship Program, shows wide variation among vocational program areas, but no difference between aggregated data for co-op programs and non-co-op programs.

Percentage of Graduates With Two or Less Employers, the eighth measure of effectiveness in Table 19, is intended to reflect employment stability, i.e., how well graduates of the various vocational programs adapt to their employment environment. The results appear favorable for both types of programs and differences among program areas do not appear significant, although no statistical test was administered to the data.

The ninth measure of effectiveness in Table 19 reflects the average duration of the graduates' longest period of employment for a particular vocational program area. The data used was for the 13 to 18 month follow-up period. Some of the variation in the averages for the programs may be due to the particular time within the follow-up period at which data were collected. It would be well in future studies to reduce this source of variation. The difference of slightly more than 1 month between the average duration of employment for graduates of co-op and non-co-op programs is significant at the 95 percent confidence level when the Aspin-Welch test of significance** is applied to the data,

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* Ibid., pp 467-469

** Ibid., pp 476-477

yielding a test statistic of 2.49. In realistic terms, a one month differential may not be very meaningful.

The final measure of effectiveness in Table 19, Average weeks After Graduation Until Obtaining Full-Time Employment, shows a difference of 1.5 weeks between co-op and non-co-op programs. This is significant at the 95 percent confidence level when the Aspin-Welch test of significance is applied, yielding a test statistic of 2.10. There is quite a bit of variation for individual program areas in this measure. However, the data appear to reflect the fact that co-op students tend to find full-time employment sooner than non-co-op students. This seems realistic in that the graduates of co-op programs in some cases continue employment with the same employer they had before graduation. Once again, however, this 1.5 week differential may not mean much in a practical sense.

In summary, the ten effectiveness measures estimated for the data collected under the present study indicate the following:

- There is no significant difference in percentage of students successfully graduated from co-op and non-co-op programs.
- There is no significant difference in the unemployment rates of graduates of both types of programs although a significantly higher percentage of the co-op graduates entered the labor market sooner.
- Graduates of co-op programs entered the labor market with a lower entry wage rate which increased more rapidly than the wage rates of graduates of non-co-op programs; however, after a 13 to 18 month follow-up period, the graduates of non-co-op programs still had a significantly higher wage rate. It is important to remember that the labor market conditions in non-co-op occupational areas are different than those for co-op areas, e.g., auto mechanics versus sales clerk.
- There is no significant difference in the percentage of graduates entering the local labor market as opposed to those entering other labor markets for the two types of programs; however, after a follow-up period, it appears that this percentage drops significantly for both types of programs.

- There is no significant difference between program types on the percentage of graduates admitted to formal apprenticeship programs.
- There is no significant difference between program types with respect to employment stability, measured as the percentage of graduates with two or less employers during the follow-up period; the stability measure appears favorable for both types of programs.
- The graduates of non-co-op programs have an average length of longest employment which is one month greater than co-op program graduates for the follow-up period, and this difference is statistically significant. Practically, however, this is not a great difference.
- Co-op graduates tend to find full-time employment an average of 1.5 weeks sooner than non-co-op graduates which is a statistically significant difference, but not a practical difference.

These results are indicated by the present study but caution should be exercised in assuming that they hold in general. Since the sample of programs selected was not made in a random manner, the generality of the conclusions to cover all geographical regions, program areas, etc., is questionable. Furthermore, it would be desirable to improve the data collection processes in order to reduce the amount of missing data encountered under the present study.

On FORM E, data were also collected on reasons for graduates leaving their last place of employment. These data were collected to study the positive reasons for changing employment. Only 243 responses were received of the 1376 students in the sample, i.e., about 17 percent of the students. Because of the small number of responses, no comparison of the two types of programs was attempted. However, the summary for all programs is interesting and is presented here. Basically, the reasons can be grouped into the following categories:

Percentage Distribution	Reason for Leaving Last Place of Employment
57.6%	Job Improvement
26.7%	Left the Local Labor Market
9.4%	Dissatisfaction on Part of Employer
6.3%	Miscellaneous Reasons

Those leaving for job improvement indicated that they obtained better employment, an increase in pay, or were dissatisfied with their former employment. Thus 57.6 percent of the reasons for seeking new employment were positive. Those who left the labor market did so to enter military service, to attend school, to assume family responsibilities, or because of health reasons or they moved from the community. The graduates who left because of dissatisfaction on the part of the employer were either discharged, unable to do the work, or had a personality conflict. The miscellaneous reasons included employer companies moved, not full-time employment, short-term jobs, bad hours, and returned to previous job.

The remaining subsection in this section on the effectiveness analysis concerns data collected from a survey of employers in each of the communities used in this study.

Survey of Employers

This was a minimal survey of employers in each community. Each school district provided us with about 15 firms that had hired the majority of graduates of vocational programs. We mailed 200 questionnaires and received completed questionnaires from 90 firms. This is a 45 percent response rate.

The size of the firms based on the number of employees ranged between 3 and 5,000, with a mean of 377. The distribution of firms based on three size categories is as follows:

Number of Employees	Number of Firms	Percentage
Less than 25	36	40.0%
25 to 100	21	23.3%
Greater than 100	33	36.7%
Total	90	100.0%

Thus, there is a fairly good representation of firms based on the number of employees.

Several points must be kept in mind in reviewing the results of this survey.

- The questionnaire is an attitudinal instrument that does not require any analysis of data on the part of the respondent.
- The school district personnel provided the names of the potential respondents. In every case we asked for an unbiased list.
- It was essential that the firm have knowledge and experience with both co-op and non-co-op vocational graduates. In many cases we suspect that this meant that the firms had worked with co-op students while they were in school. Thus, there is probably an inherent bias stemming from this. Of course, we have no way of knowing whether the bias is positive or negative with regard to co-op students.
- The sample size (90 responses) is small.
- The respondent may be expressing an attitude based on a small sample of employees who were graduates of either co-op or non-co-op vocational programs.

The questionnaire is divided into three main parts:

- Hiring and training experiences
- Experience during the adjustment period of employment (first 6 months)
- Job performance after the first 6 months of employment.

Table 21 shows the questionnaire items for each of the three parts.

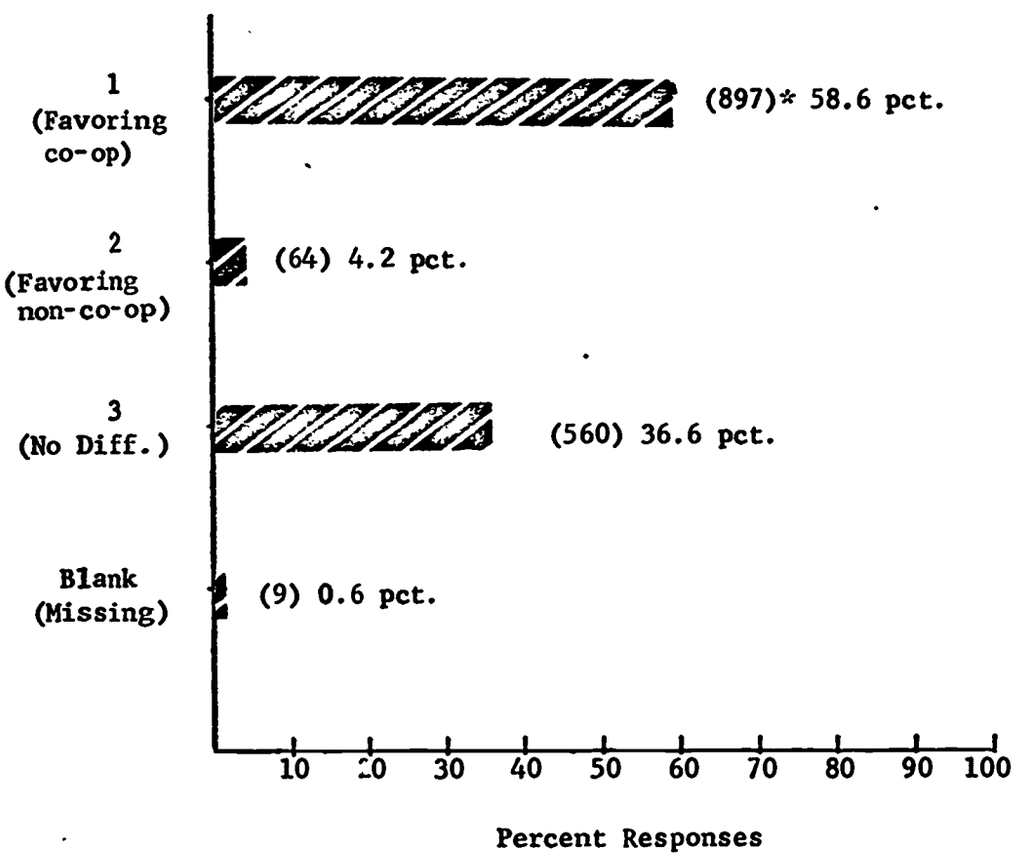
Figures 15 through 18 are summaries of the results of the survey. The results for each questionnaire item are contained in Appendix B.

These results show a very definite favorable attitude on the part of employers toward the graduates of co-op vocational programs. Figure 15 shows that the percentage of responses favoring co-op graduates is 58.6 percent versus 4.2 percent for non-co-op graduates, with 36.6 percent indicating no significant difference. The results are very similar for the three main parts of the survey, Figures 16 through 18.

The results for each questionnaire item (contained in Appendix B) show that the co-op graduates are favored for all items.

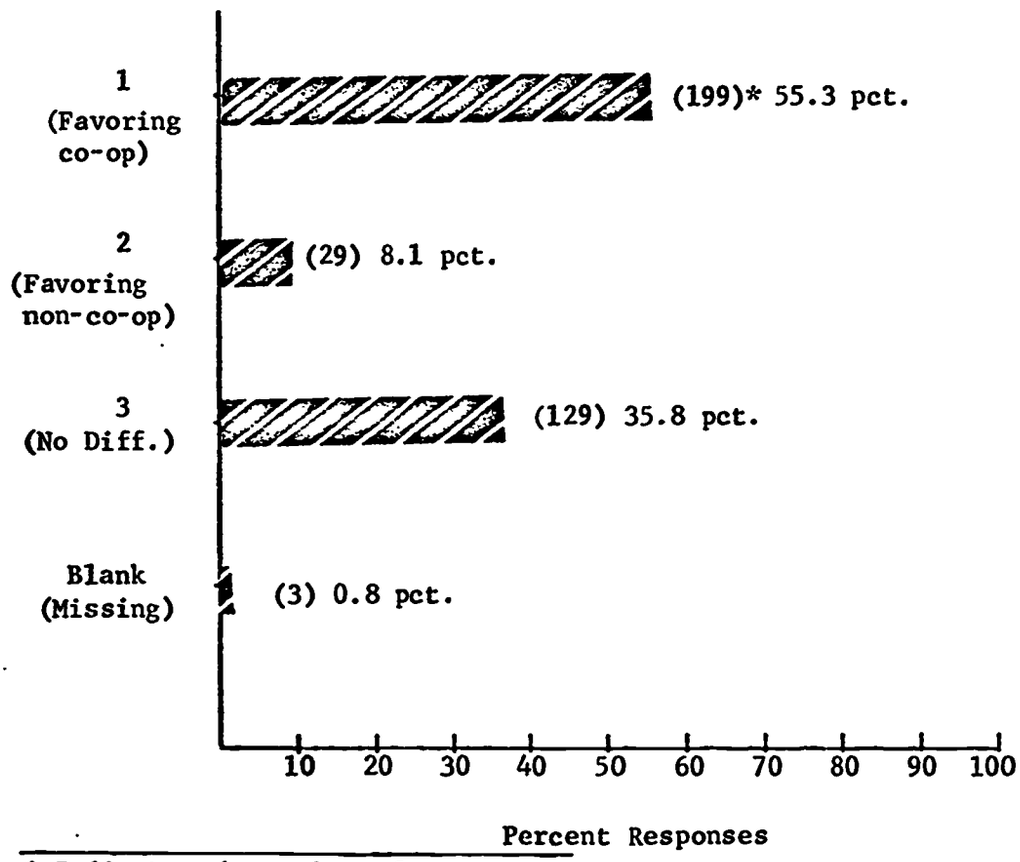
TABLE 21. EMPLOYER SURVEY QUESTIONNAIRE ITEMS

HIRING AND TRAINING EXPERIENCES	EXPERIENCE DURING THE ADJUSTMENT PERIOD OF EMPLOYMENT (First 6 Months)	JOB PERFORMANCE AFTER THE FIRST 6 MONTHS OF EMPLOYMENT
1. Generally, the proportion* hired of those who apply is greater in the case of . . .	5. Generally, the overall quantity of production or service is greater in the case of . . .	14. Generally, the overall quantity of production or service increases more rapidly in the case of . . .
2. Generally, the entry level wage is higher in the case of . . .	6. Generally, the overall quality of work is better in the case of . . .	15. Generally, the overall quality of work increases more rapidly in the case of . . .
3. Generally, the period of initial training is less in the case of . . .	7. Generally, the motivational characteristics are better in the case of . . .	16. Generally, the average wage increases more rapidly in the case of . . .
4. Generally, the cost of initial training is less in the case of . . .	8. Generally, the work habits are better in the case of . . .	17. Generally, the average proportion of dismissals is less in the case of . . .
	9. Generally, the manipulative skills are better in the case of . . .	
	10. Generally, the human relations skills are better in the case of . . .	
	11. Generally, the conceptual skills are better in the case of . . .	
	12. Generally, the average absentee rate is less in the case of . . .	
	13. Generally, the average proportion of dismissals is less in the case of . . .	



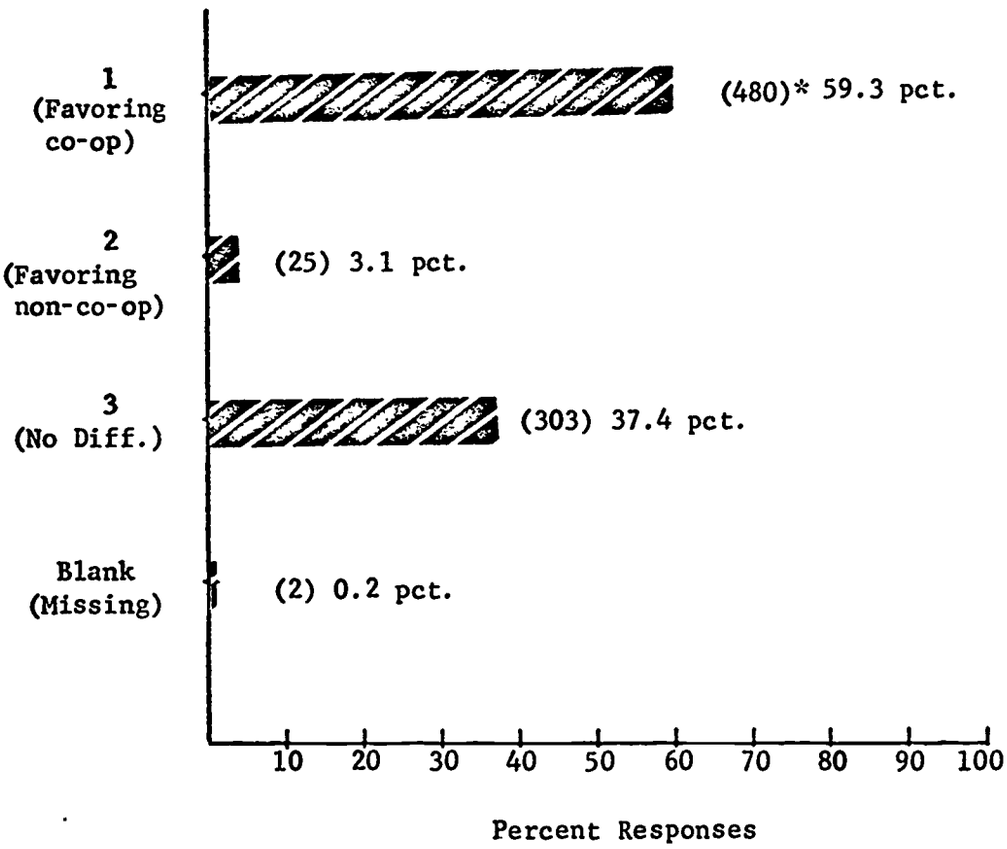
* Indicates the number of responses.

FIGURE 15. RESULTS OF EMPLOYER SURVEY, ALL QUESTIONNAIRE ITEMS



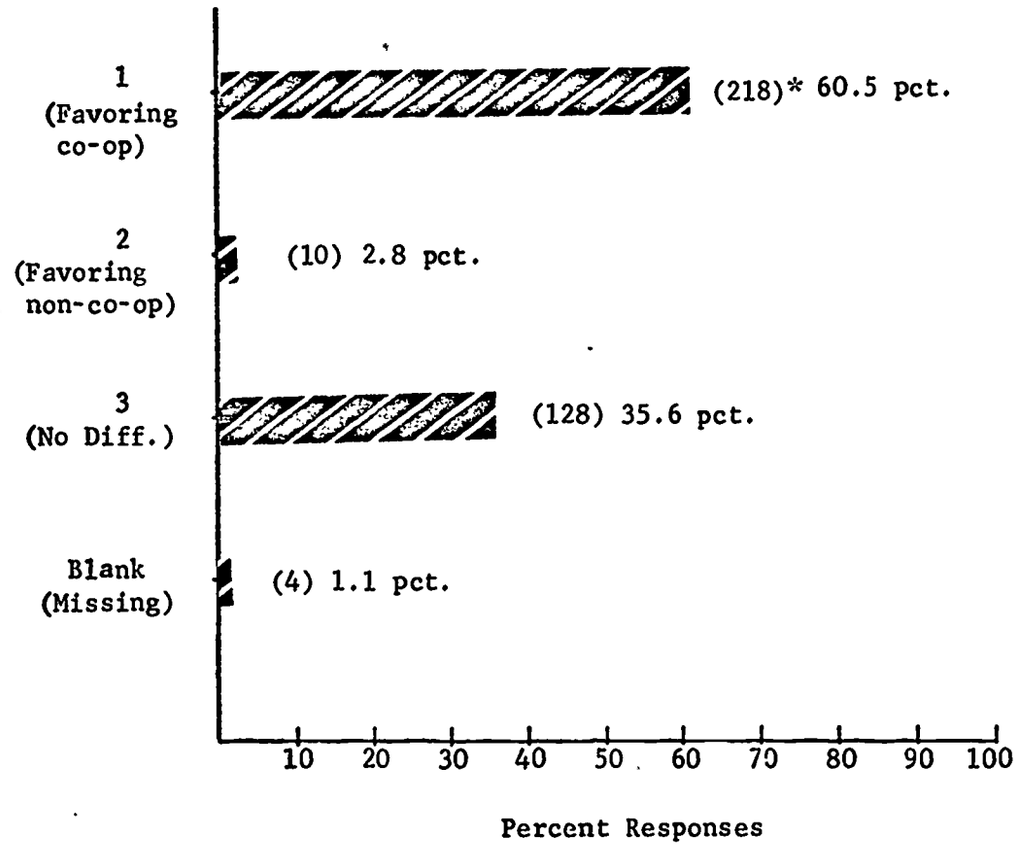
* Indicates the number of responses.

FIGURE 16. RESULTS OF EMPLOYER SURVEY, QUESTIONNAIRE ITEMS ON HIRING AND TRAINING EXPERIENCES, ITEMS 1 THROUGH 4



* Indicates the number of responses.

FIGURE 17. RESULTS OF EMPLOYER SURVEY, QUESTIONNAIRE ITEMS ON EXPERIENCE DURING THE ADJUSTMENT PERIOD, ITEMS 5 THROUGH 13



*Indicates the number of responses.

FIGURE 18. RESULTS OF EMPLOYER SURVEY, QUESTIONNAIRE ITEMS ON JOB PERFORMANCE AFTER THE FIRST 6 MONTHS OF EMPLOYMENT, ITEMS 14 THROUGH 17

Admittedly, there are several aspects of this survey that can be questioned. We cannot use these results in an absolute sense to conclude that co-op vocational programs are better than non-co-op programs; however, there is no question that the majority of the ninety employers that responded definitely have a favorable attitude toward the graduates of co-op programs.

We are very pleased with this instrument. Evidently it is clearly presented and people can complete it fairly easily. It would be very easy to use this instrument on a large, random sample of firms throughout the country in order to obtain a preliminary view of the attitudes of employers toward employees who are graduates of co-op vocational programs versus those who are graduates of non-co-op vocational programs.

Descriptive Analysis

The presentation in this section parallels the format of the two preceding sections. A discussion of the methodology used to develop this summary is presented first. Following this, the results of the analysis are presented. The final subsection discusses the interpretations of the analysis.

Throughout these sections, three distinct subsets of the descriptive data are considered. The first subset concerns descriptive data which pertain to a particular school in which vocational programs were studied. The second subset is concerned with descriptive data concerning the particular vocational program areas themselves. The third and final subset of data consists of descriptive information from the follow-up of a representative sample of graduates of the vocational programs.

Methodology

The descriptive data were collected through particular data items on the following three instruments:

- FORM B. Individual School Enrollment Data
- FORM D. Vocational Program Descriptive and Effectiveness Data, Part I
- FORM E. Vocational Program Descriptive and Effectiveness Data, Student Follow-up Data, Part II.

Copies of these forms appear in Appendix A of this report.

The descriptive data pertaining to the schools were collected on FORM B. This form reported data on the following items for two school years, the 1969-1970 year and the 1970-71 year:

- Senior Year Enrollment
- Junior Year Enrollment
- Senior Year Dropouts
- Junior Year Dropouts.

These measures were requested according to the following classifications of students:

- Nonvocational
- Co-op Vocational
- Non-co-op Vocational
- Total.

In addition, the form collected data on the racial mix of the students and the average daily attendance for the two school years.

The data have been averaged over the two school years and these averages are reported for each school. In addition, the percentage distribution by student classification of the enrollment data and dropout data were calculated for each year. These percentages were calculated as the ratio of the number of students in a classification to the total number of students reported for the measure for each year. The percentages were then averaged for both years. (Because the percentages were calculated for each year first, and then averaged over both years, they differ sometimes from the ratios of the reported averages. This difference when it occurs is insignificant in relation to the magnitude of the percentage.)

In a few cases data were reported only for one school year. In these cases, which are noted in the summaries, the data are presented for the one year reported, and are not averages. In one case, complete data were not reported by a particular school. This case is indicated in the tables.

The descriptive summaries for particular vocational program areas were developed from data reported on FORM D. The measures developed for this summary include information on the following items:

- Age of vocational programs
- Size of junior and senior class
- Distribution of students in the class according to the following classification:
  - regular students
  - disadvantaged students
  - handicapped students
- Percentage of programs with occupational advisory committees and descriptive data on these committees' activities
- Prerequisite requirements, and their minimum standards
- Weekly duration of time students spend in vocational laboratories and/or shops, nonlaboratory vocational instruction, and in nonvocational instruction
- Duration of time spent on the job for co-op vocational programs.

The measures are reported as averages or percentage breakouts, where data have been aggregated within vocational program areas. Where averages are presented, standard deviations are also presented to indicate the amount of variation in the data within a program area. The measures were calculated using standard statistical methods. Very little missing data were encountered with this form as will become evident when the summaries are presented later.

The descriptive measures based upon follow-up data on a representative sample of graduates of the vocational programs were developed from the data reported on FORM E. Included in this summary is information on the following items:

- Number of graduates followed up
- Distribution by sex
- Distribution by race
- Percentage graduated
- Attendance record during junior and senior year
- Employment experience for students in co-op vocational programs.

Again, data were aggregated within vocational program areas, and are reported as averages or percentages, calculated using standard statistical methods. Missing data were minimal for these descriptive items on FORM E, as compared with the effectiveness measures discussed earlier.

Results of the Descriptive Analysis

Tables 22 and 23 present a summary of descriptive data collected on junior and senior year enrollment. The data are presented for each of the twenty schools participating in the study. The average yearly enrollment is shown. The percentage distribution of the enrollment is also shown, as is average daily attendance (ADA). For example, for school number one, on the average 60.5 percent of the junior enrollment is non-vocational, 5.5 percent is co-op vocational, and 34 percent is non-co-op vocational. These figures represent averages based upon data collected for two school years, except as noted in the tables.

In Tables 24 and 25, a summary of the descriptive data collected on students who dropped out of school is presented. The average number of dropouts is presented along with the average percentage of dropouts based upon the average enrollment for students in the classification. For example, the percentage of students in nonvocational programs who dropped out of school is calculated as the ratio of the number of student dropouts in nonvocational programs to the number of students enrolled in nonvocational programs, averaged over both years of data. Thus, in Table 24 for school number one, on the average 7.6 percent of the junior year students enrolled in nonvocational programs dropped out of school, 5.2 percent of the students in co-op programs dropped out, 0.6 percent of

TABLE 22. JUNIOR-YEAR SCHOOL ENROLLMENT DATA
(AVERAGES FOR TWO SCHOOI YEARS)

School No.	School ID	Average Jr. Yr. Enrollment				Percentage Distribution Enrollment - Jr. Yr.			ADA[a]
		Non Voc.	Co-op Voc.	Non Co-op Voc.	Total	Non Voc.	Co-op Voc.	Non Co-op Voc.	Jr. Yr.
1	10	373.5	34.0	209.0	616.5	60.5	5.5	34.0	579.0
2	20	192.5	70.5	249.5	512.5	37.4	13.8	48.8	445.5
3	21	361.5	76.0	345.0	782.5	46.1	9.8	44.2	659.0
4	22	157.0	51.5	261.5	470.0	33.0	10.5	56.6	418.5
5	30	262.5	0.0	150.0	412.5	63.6	0.0	36.4	385.0
6	40	106.0	0.0	63.0	169.0	63.0	0.0	37.0	160.0
7	50	26.0	14.0	112.0	152.0	17.2	9.2	73.6	144.5
8	51	97.5	30.5	163.5	291.5	33.6	10.4	56.0	250.5
9	60	168.5	48.0	89.0	305.5	55.2	15.7	29.1	270.5
10	70	552.0	117.0	78.5	747.5	73.5	15.8	10.7	680.5
11	80	342.0	25.0	125.0	492.0	69.2	5.1	25.6	491.5
12	81	284.5	25.0	100.0	409.5	69.5	6.1	24.4	407.5
13	82	152.5	25.0	122.5	300.0	51.1	8.4	40.5	298.5
14	90	453.5	40.5	25.5	519.5	87.5	7.7	4.9	442.0
15	91	420.5	32.5	8.0	461.0	91.1	7.2	1.7	401.0
16	92	219.0	42.0	0.0	561.0	92.4	7.6	0.0	482.0
17	100	82.0	0.0	229.0	311.0	26.1	0.0	73.9	292.5
18[b]	110				585.0				545.0
19[c]	120	273.0	0.0	112.0	385.0	71.2	0.0	28.8	348.0
20[c]	121	0.0	0.0	175.5	175.5	0.0	0.0	100.0	156.5

(a) Average Daily Attendance

(b) No enrollment breakout was reported.

(c) These two schools are in the same district. School No. 19 is a comprehensive high school; School No. 20 is a technical high school offering only non-co-op vocational training.

TABLE 23. SENIOR-YEAR SCHOOL ENROLLMENT DATA
(AVERAGES FOR TWO SCHOOL YEARS)

School No.	School ID	Average Sr. Yr. Enrollment				Percentage Distribution Enrollment - Sr. Yr.			ADA[a]
		Non Voc.	Co-op Voc.	Non Co-op Voc.	Total	Non Voc.	Co-op Voc.	Non Co-op Voc.	Sr. Yr.
1	10	330.0	34.0	165.5	529.5	62.2	6.4	31.5	497.5
2	20	136.5	83.5	232.5	452.5	30.2	18.4	51.4	393.0
3	21	317.0	79.0	281.5	677.5	46.6	11.7	41.7	570.5
4	22	137.5	53.5	219.5	410.5	33.4	13.0	53.5	366.0
5	30	147.5	67.5	180.0	395.0	37.3	17.1	45.6	366.5
6	40	107.5	32.5	2.5	142.5	75.5	22.7	1.8	135.0
7	50	20.5	16.5	93.0	130.0	16.1	12.7	71.2	127.0
8	51	34.5	57.0	147.0	238.5	14.5	23.9	61.6	217.0
9	60	187.0	51.0	51.5	289.5	64.6	17.6	17.8	267.0
10	70	550.5	133.5	84.5	768.5	71.7	17.4	11.0	651.0
11	80	355.5	50.0	125.0	530.5	65.2	9.9	24.8	528.5
12	81	293.5	50.0	100.0	443.5	65.8	11.4	22.8	442.0
13[b]	82	104.0	50.0	100.0	254.0	40.9	19.7	39.4	125.0
14	90	403.5	17.0	21.5	442.0	91.3	3.8	4.8	362.5
15	91	375.5	30.0	9.0	414.5	90.6	7.2	2.2	364.0
16	92	513.0	19.0	0	532.0	96.4	3.6	0.0	447.5
17	100	75.0	25.5	216.0	316.5	23.5	8.1	68.4	310.5
18[c]	110				494.0				463.5
19[d]	120	214.5	65.0	44.0	323.5	66.6	20.1	13.3	288.5
20[d]	121	0.0	0.0	153.0	153.0	0.0	0.0	100.0	144.0

(a) Average Daily Attendance

(b) Missing one year of data.

(c) No enrollment breakout was reported.

(d) These two schools are in the same district. School No. 19 is a comprehensive high school; School No. 20 is a technical high school offering only non-co-op vocational training.

TABLE 24. JUNIOR-YEAR SCHOOL DROPOUT DATA
(AVERAGES FOR TWO SCHOOL YEARS)

School No.	School ID	Average Jr. Yr. Dropouts[a]				Average Dropout Percentage of Enrollment[a]			
		Non Voc.	Co-op Voc.	Non Co-op Voc.	Total	Non Voc.	Co-op Voc.	Non Co-op Voc.	Total
1	10	28.0	1.5	1.0	30.5	7.6	5.2	0.6	4.9
2	20	17.0	6.0	21.5	44.5	8.8	8.5	8.6	8.7
3	21	52.0	11.0	49.0	112.0	14.3	14.5	14.2	14.2
4	22	13.0	4.0	22.0	39.0	8.3	7.4	8.4	8.3
5	30	14.5	--	0.0	14.5	5.6	--	0.0	3.5
6	40	2.0	--	0.5	2.5	1.9	--	0.7	1.5
7	50	8.0	2.0	3.0	13.0	34.4	14.4	2.6	8.5
8	51	13.5	8.5	12.0	34.0	13.6	28.8	7.6	11.8
9	60	16.5	3.0	2.0	21.5	9.8	6.3	2.2	7.0
10	70	34.5	0.0	0.0	34.5	6.0	0.0	0.0	4.5
11[b]	80	42.0	0.0	2.0	44.0	14.2	0.0	1.6	9.9
12[b]	81	18.0	0.0	0.0	18.0	6.1	0.0	0.0	4.3
13[c]	82								
14	90	23.5	0.5	2.0	26.0	5.2	2.1	9.5	5.1
15	91	32.5	5.5	0.0	38.0	7.9	21.2	0.0	8.3
16	92	12.0	0.0	--	12.0	2.4	0.0	--	2.2
17	100	10.5	--	4.0	14.5	12.8	--	1.7	4.6
18[c]	110								
19[d]	120	0.0	--	19.5	19.5	0.0	--	18.7	5.1
20[d]	121	--	--	5.5	5.5	--	--	3.1	3.1

(a) The dashed-line entries (--) indicate no students in these classifications.

(b) Missing one year of data.

(c) No dropout data were reported.

(d) These two schools are in the same district. School No. 19 is a comprehensive high school; School No. 20 is a technical high school offering only non-co-op vocational training.

TABLE 25. SENIOR-YEAR SCHOOL DROPOUT DATA
(AVERAGES FOR TWO SCHOOL YEARS)

School No.	School ID	Average Sr. Yr. Dropouts (a) Non Voc.	Co-op Voc.	Non Co-op Voc.	Total	Average Dropout Percentage of Enrollment (a) Non Voc.	Co-op Voc.	Non Co-op Voc.	Total
1	10	23.0	2.0	3.0	28.0	7.1	6.5	1.8	5.3
2	20	7.0	4.0	11.0	22.0	5.1	4.9	4.7	4.9
3	21	26.0	6.5	23.5	56.0	8.1	8.3	8.4	8.2
4	22	6.5	2.5	10.5	19.5	4.7	4.6	4.8	4.7
5	30	13.5	0.0	1.5	15.0	9.1	0.0	0.9	3.8
5	40	1.5	0.0	1.0	2.5	1.4	0.0	33.3	1.8
7	50	5.5	2.5	5.0	13.0	29.8	15.1	6.1	10.2
8	51	3.5	6.0	3.5	13.0	16.0	10.6	2.3	5.4
9	60	17.5	2.5	0.0	20.0	9.5	4.9	0.0	6.9
10	70	71.5	0.0	0.0	71.5	13.1	0.0	0.0	9.4
11	80	37.5	0.0	0.5	38.0	11.8	0.0	0.4	7.5
12	81	22.5	0.5	0.5	23.5	8.0	1.0	0.5	5.4
13 (b)	82	22.0	0.0	22.0	44.0	21.2	0.0	22.0	17.3
14	90	26.5	1.0	0.5	28.0	6.6	6.7	3.3	6.4
15	91	15.0	1.0	1.0	17.0	4.0	3.3	10.0	4.1
16	92	9.0	0.5	--	9.5	1.8	2.9	--	1.8
17	100	2.5	0.0	1.0	3.5	3.5	0.0	0.5	1.1
18 (c)	110								
19 (d)	120	0.0	0.0	9.5	9.5	0.0	0.0	39.5	2.9
20 (d)	121	--	--	1.5	1.5	--	--	1.0	1.0

(a) The dashed-line entries (--) indicate no students in these classifications.

(b) Missing one year of data.

(c) No dropout data were reported.

(d) These two schools are in the same district. School No. 19 is a comprehensive high school; School No. 20 is a technical high school offering only non-co-op vocational training.

the students in non-co-op programs dropped out, and 4.9 percent of the total junior year enrollment dropped out.*

Table 26 presents a summary of the descriptive data collected on racial mix for the schools. Four of the twenty schools in the study did not report data on this measure. The categories shown in the table represent the races present at these schools. The form allowed for reporting enrollment of other racial groups, but those other groups were not present at these particular schools. The entries in the table are averages based upon data collected for both school years.

Table 27 contains a summary of the descriptive data collected on individual vocational programs within the schools. The summary is at a level where individual vocational program data have been aggregated within the 14 vocational program areas identified for the study. A total of 83 vocational programs were studied. Of these, 39 were co-op vocational programs and 44 were non-co-op. Whenever missing data occurred for a particular measure, the number of programs with data upon which the measure was calculated has been indicated, if it was considered meaningful to do so. For the third and fourth measures, size of junior class and percentage distribution of junior classes, no data were reported by the schools for Trade and Industrial programs and for Special Office Training. Either data were not readily available for these program areas, or else there may be no offerings in the junior year for them. Under the eighth measure, dealing with prerequisites and admission criteria, the blank entries occur because the criterion or prerequisites being considered do not apply to that particular program area. The minimum grade point criterion was based upon a grading system where A=4.0, B=3.0, and C=2.0.

Further descriptive data for programs having an occupational advisory committee are presented in Table 28. Again, the blank entries for Cooperative Work Experience and Auto Body are due to the fact that these programs had no such committees.

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* A note of caution: The number of dropouts may not be students who actually dropped out of school. The district's records might include students who transferred, or moved, etc. The number of true dropouts is probably less than the number reported.

TABLE 26. SCHOOL RACIAL MIX DATA
(AVERAGES FOR TWO SCHOOL YEARS)

School No.	School ID	Racial Mix[a] AI	B	MA	O	W	Total
1	10	0.5	10.5	0.0	2.5	2124.5	2138.0
2	20	0.0	308.0	1.0	0.5	1273.5	1583.0
3	21	4.0	567.5	2.0	2.5	1928.5	2504.5
4	22	1.5	213.5	1.5	0.0	1235.5	1452.0
5	30	0.0	0.0	7.0	1.0	1410.0	1418.0
6	40	2.0	0.0	0.0	0.0	494.5	496.5
7	50	0.0	40.5	0.0	0.0	704.0	744.5
8	51	0.0	23.5	0.0	0.0	1257.0	1280.5
9	60	0.0	155.5	0.0	0.0	849.5	1005.0
10	70	0.0	3.5	0.0	6.0	2352.5	2362.0
11[b]	80						
12[b]	81						
13[b]	82						
14	90	15.5	32.5	3.5	7.5	1548.0	1607.0
15	91	14.0	4.5	0.5	2.0	1376.5	1397.5
16	92	0.5	1.5	1.0	1.0	1649.0	1653.0
17	100	10.5	19.0	24.0	1.5	3127.5	3182.5
18[b]	110						
19	120	5.5	82.0	1.0	4.0	1790.0	1882.5
20	121	0.0	33.0	0.0	0.0	301.5	334.5

[a] AI - American Indian
B - Black, Afro-American, or Negro
MA - Mexican American, or Chicano
O - Oriental, or Asian American
W - White, or Caucasian

[b] No racial mix data were reported.

TABLE 27. SUMMARY OF DESCRIPTIVE DATA FOR VOCATIONAL PROGRAMS

Descriptive Measures	Co-op						Non-co-op										
	Co-op Dist. Educ.	Div. Co-op Trg.	Co-op Off. Educ.	Trade + Ind.	Co-op Work Exp.	All Co-op Programs	Auto Mech.	Auto Body	Elect.	Drafting	Mach. Trades	Spec. Off. Trg.	Gen. Off.	Steno.	Welding	All-Non Co-op Programs	All Programs
1. Total Number of Programs in Study	16	10	10	2	1	39	6	1	9	6	8	3	7	3	1	44	83
2. Age of Program (Years) (12 used as base)																	
-Average	9.1	8.6	7.9	4.0	6.0	8.3	12.2	5.0	9.6	6.6	17.1	4.0	7.7	11.7	3.0	10.2	9.3
-(Standard Deviation)	(5.9)	(9.0)	(5.6)	(0.0)	(0.0)	(6.4)	(11.8)	(0.0)	(8.2)	(1.1)	(14.1)	(0.0)	(6.6)	(9.0)	(0.0)	(9.5)	(8.3)
-(Number of Programs)	(15)	(9)	(9)	(2)	(1)	(36)	(6)	(1)	(9)	(5)	(8)	(3)	(7)	(3)	(1)	(43)	(79)
3. Size of Junior Class																	
-Average	29.3	21.7	48.0	--	45.0	28.5	22.5	19.0	16.5	20.0	19.4	--	37.3	51.0	24.0	24.1	25.8
-(Standard Deviation)	(13.2)	(9.1)	(0.0)	--	(0.0)	(13.0)	(14.1)	(0.0)	(5.8)	(9.6)	(11.8)	--	(22.8)	(24.2)	(0.0)	(15.9)	(14.8)
-(Number of Programs)	(13)	(7)	(1)	--	(1)	(22)	(6)	(1)	(8)	(6)	(7)	--	(4)	(3)	(1)	(30)	(52)
4. Percentage Distribution of Junior Class (22 co-op programs; 36 non-co-op programs)																	
-Regular	86.7	100.0	93.8	--	33.3	86.7	92.0	100.0	97.0	99.0	94.3	--	90.6	94.1	58.3	93.4	90.6
-Disadvantaged*	11.9	0.0	6.2	--	66.7	12.6	6.7	0.0	3.0	1.0	5.7	--	9.4	5.9	41.7	6.2	8.9
-Handicapped**	1.4	0.0	0.0	--	0.0	0.7	1.3	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.4	0.5
5. Size of Senior Class																	
-Average	28.6	19.7	22.8	18.0	45.0	24.7	19.8	8.0	13.7	13.2	17.2	22.7	26.3	44.5	20.0	19.3	21.9
-(Standard Deviation)	(18.7)	(7.1)	(17.5)	(5.7)	(0.0)	(15.8)	(14.2)	(0.0)	(6.1)	(5.9)	(9.1)	(2.1)	(12.1)	(0.7)	(0.0)	(11.2)	(13.7)
-(Number of Programs)	(16)	(10)	(10)	(2)	(1)	(39)	(6)	(1)	(9)	(6)	(8)	(3)	(7)	(2)	(1)	(43)	(82)
6. Percentage Distribution of Senior Class (39 co-op programs; 43 non-co-op programs)																	
-Regular	90.9	98.5	94.3	63.9	35.6	89.5	93.4	100.0	94.9	98.5	90.7	100.0	88.0	92.1	50.0	91.7	90.5
-Disadvantaged*	8.4	1.5	5.7	27.8	64.4	9.7	5.0	0.0	5.1	1.5	7.0	0.0	12.0	7.9	50.0	7.8	8.8
-Handicapped**	0.7	0.0	0.0	8.3	0.0	0.8	1.6	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.5	0.7
7. Percentage of Programs with Occupational Advisory Com	75.0	60.0	80.0	100.0	0.0	71.8	66.7	0.0	44.4	50.0	50.0	100.0	71.4	100.0	100.0	61.4	66.3
8. (a) Percentage of Programs with Prerequisites	75.0	30.0	90.0	100.0	0.0	66.7	66.7	0.0	44.4	50.0	25.0	100.0	71.4	66.7	100.0	54.5	60.2
(b) Percentage of Programs with Grade Point																	
-Average Criterion	43.8	20.0	50.0	50.0	0.0	38.5	33.3	0.0	22.2	16.7	12.5	100.0	57.1	66.7	0.0	34.1	36.2
-Fast Attendance Criterion	68.8	60.0	90.0	100.0	0.0	71.8	33.3	0.0	22.2	16.7	12.5	100.0	28.6	0.0	0.0	25.0	47.0
(c) Minimum Grade Point Average																	
-Average	1.64	2.00	1.90	1.00	--	1.73	2.00	--	2.00	2.00	2.00	2.00	2.17	2.00	--	2.04	1.87
-(Standard Deviation)	(0.38)	(0.00)	(0.22)	(0.00)	--	(0.38)	(0.00)	--	(0.00)	(0.00)	(0.00)	(0.00)	(0.29)	(0.00)	--	(0.13)	(0.29)
-(Number)	(7)	(2)	(5)	(1)	--	(15)	(2)	--	(1)	(1)	(1)	(3)	(3)	(2)	--	(13)	(28)
(d) Minimum Standard Days of Attendance																	
-Average	20.1	31.4	14.7	23.0	--	21.3	38.5	--	32.0	54.0	16.0	10.0	54.0	--	--	31.7	24.9
-(Standard Deviation)	(9.8)	(23.3)	(10.4)	(18.4)	--	(15.1)	(47.4)	--	(31.1)	(0.0)	(0.0)	(0.0)	(25.5)	--	--	(26.7)	(20.1)
-(Number)	(7)	(5)	(7)	(2)	--	(21)	(2)	--	(2)	(1)	(1)	(3)	(2)	--	--	(11)	(32)

* The vocational education definition of a disadvantaged student was used.
** The term "handicapped" as defined by Federal legislation was used.

TABLE 28. SUMMARY OF DESCRIPTIVE MEASURES FOR PROGRAMS WITH AN OCCUPATIONAL ADVISORY COMMITTEE

Descriptive Measures	Co-op						Non-co-op										
	Co-op Dist. Ed.	Div. Co-op Trg.	Co-op Off. Ed.	Trade + Ind.	Co-op Work Exp.	All Co-op Programs	Auto. Mech.	Auto Body	Electr.	Drafting	Mach. Trades	Spec. Off. Ed.	Gen. Off.	Steno	Welding	All Non-Co-op Programs	All Programs
1. Number of Programs in the Study	16	10	10	2	1	39	6	1	9	6	8	3	7	3	1	44	83
2. Number of Meetings Per Year																	
-Average	2.4	3.2	2.0	7.5	--	2.8	1.5	--	1.5	1.5	1.5	2.0	4.5	2.0	2.0	2.1	2.5
-(Standard Deviation)	(3.3)	(5.0)	(0.9)	(6.4)	--	(3.5)	(0.6)	--	(0.6)	(0.7)	(0.6)	(0.0)	(5.1)	(1.0)	(0.0)	(2.2)	(2.9)
-(Number)	(11)	(5)	(8)	(2)	--	(26)	(4)	--	(4)	(2)	(4)	(2)	(4)	(3)	(1)	(24)	(50)
3. Number of Members																	
-Average	8.5	5.2	12.5	11.0	--	9.3	8.0	--	5.0	8.3	5.5	7.0	15.5	18.3	6.0	9.4	9.4
-(Standard Deviation)	(4.0)	(1.1)	(12.2)	(5.7)	--	(7.5)	(1.6)	--	(2.6)	(4.7)	(1.7)	(0.0)	(17.0)	(19.7)	(0.0)	(9.5)	(8.6)
-(Number)	(11)	(5)	(8)	(2)	--	(26)	(4)	--	(4)	(3)	(4)	(2)	(4)	(3)	(1)	(25)	(51)
4. Percentage Distribution of Members																	
-Non-school	64.7	96.2	87.2	77.3	--	78.6	87.5	--	80.0	84.3	72.7	71.4	78.7	83.6	66.7	80.4	79.5
-Union-Labor	8.2	3.8	25.6	18.2	--	15.8	2.5	--	16.0	0.0	18.2	0.0	5.2	5.5	16.7	6.5	11.2
5. Average Meeting Attendance																	
-Average	7.6	3.2	9.0	8.0	--	7.4	6.0	--	4.8	7.3	4.5	7.0	12.0	14.0	6.0	7.7	7.6
-(Standard Deviation)	(2.8)	(2.2)	(7.7)	(1.4)	--	(5.0)	(0.8)	--	(2.8)	(3.8)	(1.3)	(0.0)	(10.7)	(12.2)	(0.0)	(6.4)	(5.7)
-(Number)	(11)	(4)	(8)	(2)	--	(25)	(4)	--	(4)	(3)	(4)	(2)	(4)	(3)	(1)	(25)	(50)
6. Percentage Distribution of Committee Activities Performed Frequently																	
-Identifies/Reviews Program Objectives	50.0	33.3	62.5	50.0	--	50.0	75.0	--	75.0	33.3	75.0	0.0	60.0	66.7	100.0	59.3	54.5
-Suggests Appropriate Learning Experiences	8.3	33.3	37.5	50.0	--	25.0	50.0	--	75.0	66.7	75.0	0.0	80.0	100.0	100.0	66.7	45.5
-Recommends Standards for Student Performance	8.3	66.7	37.5	50.0	--	32.1	50.0	--	75.0	33.3	75.0	0.0	60.0	100.0	100.0	59.3	45.5
-Determines Lab/Shop Equipment Needs	8.3	16.7	12.5	0.0	--	10.7	50.0	--	50.0	33.3	75.0	0.0	60.0	66.7	100.0	51.9	30.9
-Assesses Local Labor Market Needs	16.7	16.7	25.0	100.0	--	25.0	25.0	--	50.0	0.0	25.0	0.0	60.0	66.7	100.0	37.0	30.9
-Solicits Employ. Opportunities for Program Grads.	33.3	66.7	75.0	50.0	--	53.6	75.0	--	50.0	66.7	50.0	0.0	40.0	66.7	0.0	48.2	50.9
-Acts as Liaison between School and Employers	16.7	50.0	37.5	100.0	--	35.7	50.0	--	75.0	33.3	75.0	0.0	60.0	100.0	100.0	59.3	47.3
-Participates in Public Relations Activities	16.7	16.7	25.0	100.0	--	24.4	25.0	--	0.0	0.0	0.0	0.0	40.0	33.3	0.0	14.8	20.0
-Number	(12)	(6)	(8)	(2)	--	(28)	(4)	--	(4)	(3)	(4)	(3)	(5)	(3)	(1)	(27)	(55)

Table 29 presents a listing of the prerequisites which were identified by the schools for their programs. This is a simplified summary since not all the prerequisites for a given program area were indicated for a particular program within that area. Also, some of the prerequisites indicated in some program areas seem general enough to be applicable to all areas (such as age requirement or parental approval) yet were not always indicated. This may be due in part to the fact that the prerequisites appeared obvious and were not always specified.

Tables 30 and 31 present further descriptive information on cooperative vocational programs only. They offer a measure of the average amount of time the students in this type of program spend in various types of instruction and in on-the-job training.

Tables 32 and 33 offer similar descriptive information for non-co-op vocational programs as Tables 30 and 31, with the exception of on-the-job training measures which are not applicable to these programs.

Table 34 summarizes additional descriptive data collected through the follow-up of a representative sample of graduates of the vocational programs. In some cases, all graduates have been followed up; in other cases, only a representative sample have been. Nevertheless, the sample provides a good indication for the total number of students, as can be seen if average sample size as listed in item 2 of this table is compared with item 5 of Table 27 (senior class size).

Table 35 presents additional information from the follow-up on the amount of time during the senior year that cooperative vocational students were <u>not</u> employed.

Finally, Table 36 presents information on the number of graduates of cooperative vocational programs who continued fulltime employment with their co-op employers after graduation.

The interpretation of these results is presented in the next subsection.

TABLE 29. SUMMARY OF PREREQUISITES INDICATED FOR VOCATIONAL PROGRAMS

CO-OP PROGRAMS	PREREQUISITES		
Distributive Education	1. Passed all junior/sophomore requirements 2. Introduction to Distributive Education 3. Fashion Merchandising	4. Sales & Marketing 5. Parental/counselor approval 6. Age requirement/class rank	7. Electronics
iversified Co-operative Training	1. Passed all junior/sophomore requirements 2. English 3. Age requirement/class rank		
o-operative Office Education	1. English 2. Typing 3. Preparatory office occupations	4. Accounting 5. Age requirement/class rank 6. Shorthand	
rade and Industry	1. Passed all junior/sophomore requirements 2. Parental/counselor approval		
o-operative Work Experience	None		
NON-CO-OP PROGRAMS	**PREREQUISITES**		
Auto Mechanics	1. Industrial Arts 2. Metals 3. Age requirement/class rank	4. Automotive Industries	
uto ody	None		
Electricity/ lectronics	1. Industrial Arts 2. Algebra I 3. Math background	4. Age requirement/class rank 5. Science background 6. Electronics I	
afting	1. Algebra I 2. Geometry 3. Math background	4. Age requirement/class rank	
achine Trades	1. Industrial Arts 2. Metals		
ecial ffice Training	1. Exploratory Business		
eneral Office	1. Exploratory Business 2. Typing 3. Accounting	4. Age requirement/class rank	
enographic	1. Typing		
elding	1. Industrial Arts		

TABLE 30. CO-OP PROGRAMS--JUNIOR-YEAR DESCRIPTIVE SUMMARY

Descriptive Measure	Co-op Distributive Education	Diversified Co-op Training	Co-op Office Education	Trade and Industry	Co-op Work Experience	All Co-op Programs
1. Number of Programs in Study	16	10	10	2	1	39
2. Weeks in School (Junior Year)						
-Average	36.4	36.3	37.0	--	36.0	36.4
-(Standard Deviation)	(0.9)	(0.8)	(1.4)	--	(0.0)	(0.9)
-(Number of Programs)	(9)	(6)	(2)	--	(1)	(18)
3. Vocational Laboratory Hours Per Week (Junior Year)						
-Average	4.6	4.2	5.0	--	0.0	4.3
-(Standard Deviation)	(5.1)	(8,0)	(0.0)	--	(0.0)	(5.6)
-(Number of Programs)	(13)	(6)	(2)	--	(1)	(22)
4. Vocational Nonlaboratory Hours Per Week (Junior Year)						
-Average	2.3	2.3	5.0	--	10.0	2.9
-(Standard Deviation)	(2.4)	(2.3)	(0.0)	--	(0.0)	(2.8)
-(Number of Programs)	(13)	(6)	(2)	--	(1)	(22)
5. Other Hours Per Week (Junior Year)						
-Average	13.5	5.7	12.5	--	10.0	11.1
-(Standard Deviation)	(6.9)	(8.1)	(3.5)	--	(0.0)	(7.4)
-(Number of Programs)	(13)	(6)	(2)	--	(1)	(22)
6. Weeks on Job (Junior Year)						
-Average	36.3	35.5	--	--	36.0	36.0
-(Standard Deviation)	(1.0)	(0.8)	--	--	(0.0)	(1.0)
-(Number of Programs)	(9)	(6)	--	--	(1)	(16)
7. Hours Per Week on Job (Junior Year)						
-Average	23.9	22.3	25.0	--	15.0	22.9
-(Standard Deviation)	(2.2)	(2.3)	(0.0)	--	(0.0)	(3.0)
-(Number of Programs)	(9)	(6)	(1)	--	(1)	(17)
8. Hours Teacher Spends in Coordination Per Week (Junior Year)						
-Average	12.6	16.2	10.0	--	15.0	13.8
-(Standard Deviation)	(2.2)	(3.2)	(0.0)	--	(0.0)	(3.1)
-(Number of Programs)	(9)	(6)	(1)	--	(1)	(17)

TABLE 31. CO-OP PROGRAMS--SENIOR-YEAR DESCRIPTIVE SUMMARY

Descriptive Measure	Co-op Distributive Education	Diversified Co-op Training	Co-op Office Education	Trade and Industry	Co-op Work Experience	All Co-op Programs
1. Number of Programs in Study	16	10	10	2	1	39
2. Weeks in School (Senior Year)						
-Average	36.6	36.2	36.4	36.5	36.0	36.4
-(Standard Deviation)	(1.0)	(0.6)	(0.8)	(0.7)	(0.0)	(0.8)
-(Number of Programs)	(16)	(10)	(10)	(2)	(1)	(39)
3. Vocational Laboratory Hours Per Week (Senior Year)						
-Average	4.7	3.0	9.5	7.5	0.0	5.5
-(Standard Deviation)	(4.2)	(5.4)	(6.7)	(3.5)	(0.0)	(5.6)
-(Number of Programs)	(16)	(10)	(10)	(2)	(1)	(39)
4. Vocational Nonlaboratory Hours Per Week (Senior Year)						
-Average	3.9	8.8	3.0	5.0	10.0	5.1
-(Standard Deviation)	(3.4)	(10.2)	(3.7)	(0.0)	(0.0)	(6.2)
-(Number of Programs)	(16)	(10)	(10)	(2)	(1)	(39)
5. Other Hours Per Week (Senior Year)						
-Average	9.6	10.4	9.5	12.5	10.0	9.9
-(Standard Deviation)	(4.7)	(10.8)	(1.6)	(3.5)	(0.0)	(6.1)
-(Number of Programs)	(16)	(10)	(10)	(2)	(1)	(39)
6. Weeks on Job (Senior Year)						
-Average	36.9	35.4	36.6	38.5	36.0	36.5
-(Standard Deviation)	(2.4)	(1.1)	(5.1)	(0.7)	(0.0)	(3.0)
-(Number of Programs)	(16)	(10)	(10)	(2)	(1)	(39)
7. Hours Per Week on Job (Senior Year)						
-Average	20.9	19.5	18.3	25.0	15.0	20.0
-(Standard Deviation)	(4.2)	(4.2)	(2.5)	(0.0)	(0.0)	(4.0)
-(Number of Programs)	(16)	(10)	(9)	(2)	(1)	(38)
8. Hours Teacher Spends in Coordination Per Week (Senior Year)						
-Average	13.3	16.7	13.6	27.5	15.0	15.0
-(Standard Deviation)	(3.4)	(2.5)	(2.3)	(24.7)	(0.0)	(5.9)
-(Number of Programs)	(15)	(9)	(10)	(2)	(1)	(37)

TABLE 32. NON-CO-OP PROGRAMS--JUNIOR-YEAR DESCRIPTIVE SUMMARY

Descriptive Measure	Auto Mech.	Auto Body.	Electr.	Drafting	Mach, Trades	Special Office Training	General Office	Steno.	Welding	All Non-co-op Programs
1. Number of Programs in Study	6	1	9	6	8	3	7	3	1	44
2. Vocational Laboratory Hours Per Week (Junior Year)										
-Average	14.2	10.0	11.6	11.3	12.1	15.0	9.0	11.7	15.0	12.0
-(Standard Deviation)	(2.0)	(0.0)	(4.5)	(5.7)	(3.1)	(0.0)	(6.5)	(5.8)	(0.0)	(4.3)
-(Number of Programs)	(6)	(1)	(9)	(6)	(8)	(3)	(5)	(3)	(1)	(42)
3. Vocational Nonlaboratory Hours Per Week (Junior Year)										
-Average	5.4	0.0	5.1	3.7	4.8	3.8	6.8	2.9	5.0	4.7
-(Standard Deviation)	(2.9)	(0.0)	(2.2)	(3.5)	(2.6)	(0.0)	(5.8)	(2.6)	(0.0)	(3.1)
-(Number of Programs)	(6)	(1)	(9)	(6)	(8)	(3)	(5)	(3)	(1)	(42)
4. Other Hours Per Week (Junior Year)										
-Average	7.9	0.0	6.4	11.3	5.9	3.8	11.0	13.3	10.0	8.0
-(Standard Deviation)	(4.0)	(0.0)	(4.9)	(8.3)	(5.0)	(0.0)	(4.2)	(5.8)	(0.0)	(5.6)
-(Number of Programs)	(6)	(1)	(9)	(6)	(8)	(3)	(5)	(3)	(1)	(42)

TABLE 33. NON-CO-OP PROGRAMS--SENIOR-YEAR DESCRIPTIVE SUMMARY

Descriptive Measure	Auto Mech.	Auto Body.	Electr.	Drafting	Mach. Trades	Special Office Training	General Office	Steno.	Welding	All Non-co-op Programs
1. Number of Programs in Study	6	1	9	6	8	3	7	3	1	44
2. Vocational Laboratory Hours Per Week (Senior Year)										
-Average	14.2	10.0	12.8	11.8	12.1	15.0	9.3	10.0	15.0	12.2
-(Standard Deviation)	(2.0)	(0.0)	(3.6)	(4.9)	(3.1)	(0.0)	(4.5)	(7.1)	(0.0)	(3.8)
-(Number of Programs)	(6)	(1)	(9)	(6)	(8)	(3)	(7)	(2)	(1)	(43)
3. Vocational Nonlaboratory Hours Per Week (Senior Year)										
-Average	5.4	0.0	4.4	4.0	4.8	6.2)	6.2	5.0	5.0	4.9
-(Standard Deviation)	(2.9)	(0.0)	(2.7)	(3.4)	(2.6)	(2.2)	(4.8)	(7.1)	(0.0)	(3.3)
-(Number of Programs)	(6)	(1)	(9)	(6)	(8)	(3)	(7)	(2)	(1)	(43)
4. Other Hours Per Week (Senior Year)										
-Average	6.5	0.0	6.4	10.6	4.8	3.8	12.9	12.5	5.0	7.7
-(Standard Deviation)	(4.2)	(0.0)	(5.5)	(8.8)	(4.6)	(0.0)	(4.9)	(3.5)	(0.0)	(6.0)
-(Number of Programs)	(6)	(1)	(9)	(6)	(8)	(3)	(7)	(2)	(1)	(43)

TABLE 34. SUMMARY OF DESCRIPTIVE DATA FROM THE FOLLOW-UP OF GRADUATES FROM VOCATIONAL PROGRAMS

Descriptive Measures	Co-op						Non-co-op										
	Co-op Dist. Ed.	Div. Co-op Trg.	Co-op Off. Ed.	Trade + Ind.	Co-op Work Exp.	All Co-op Programs	Auto. Mech.	Auto. Body	Electr.	Drafting	Mach. Trades	Spec. Off. Ed.	Gen. Off.	Steno.	Welding	All Non-Co-op Programs	All Programs
1. Number of Programs in the Study	16	10	10	2	1	39	6	1	9	6	8	3	7	3	1	44	83
2. Number of Graduates Followed Up																	
- Average	19.4	18.7	17.9	18.0	25.0	18.9	14.3	8.0	12.2	11.0	15.9	22.7	17.9	22.0	20.0	15.2	17.0
- (Standard Deviation)	(5.5)	(5.7)	(5.9)	(5.7)	(0.0)	(5.5)	(7.7)	(0.0)	(6.3)	(6.4)	(5.8)	(2.1)	(6.9)	(4.2)	(0.0)	(6.8)	(6.5)
- (Number of Programs)	(16)	(10)	(10)	(2)	(1)	(39)	(6)	(1)	(9)	(6)	(7)	(3)	(7)	(2)	(1)	(42)	(81)
3. Percentage Distribution by Sex (35 co-op programs; 37 non-co-op programs)																	
- Male	44.9	80.5	0.6	69.4	64.0	45.5	100.0	100.0	100.0	98.4	100.0	16.3	3.6	0.0	100.0	63.5	53.7
- Female	55.1	19.5	99.4	30.6	36.0	54.5	0.0	0.0	0.0	1.6	0.0	83.7	96.4	100.0	0.0	36.5	46.3
4. Percentage Distribution by Race (35 co-op programs; 37 non-co-op programs)																	
- White	91.4	83.2	88.8	100.0	40.0	87.5	87.7	50.0	93.5	98.4	94.4	98.7	95.8	86.4	65.0	92.4	89.7
- Black	6.6	14.2	10.1	0.0	36.0	9.9	6.8	50.0	4.1	1.6	4.3	1.3	2.6	9.1	0.0	4.4	7.4
- Other (Amer. Ind., Mex. Amer., Puerto-Rican)	2.0	2.6	1.1	0.0	24.0	2.6	5.5	0.0	2.4	0.0	1.3	0.0	1.6	4.5	35.0	3.2	2.9
5. Percentage Graduated (35 co-op programs; 37 non-co-op programs)	97.0	99.0	100.0	97.2	100.0	98.4	97.3	75.0	97.6	93.7	93.2	100.0	100.0	100.0	100.0	97.5	97.7
6. Days Absent 1969-70																	
- Average	11.4	10.1	8.9	7.8	3.4	10.1	7.5	9.4	6.1	9.5	9.0	7.8	6.8	3.2	2.6	7.4	8.7
- (Standard Deviation)	(5.0)	(5.3)	(4.0)	(2.3)	(0.0)	(4.8)	(4.9)	(0.0)	(4.1)	(6.6)	(6.1)	(2.7)	(4.4)	(3.3)	(0.0)	(4.7)	(5.0)
- (Number of Programs)	(15)	(9)	(7)	(2)	(1)	(34)	(5)	(1)	(6)	(5)	(6)	(3)	(6)	(2)	(1)	(35)	(69)
7. Days Absent 1970-71																	
- Average	13.4	11.3	7.9	11.7	2.2	11.2	9.6	23.6	8.4	9.4	11.4	8.3	8.0	4.9	1.8	9.2	10.1
- (Standard Deviation)	(5.9)	(6.9)	(4.4)	(8.2)	(0.0)	(6.2)	(6.8)	(0.0)	(5.4)	(7.2)	(8.6)	(1.6)	(6.5)	(5.8)	(0.0)	(6.5)	(6.4)
- (Number of Programs)	(15)	(9)	(8)	(2)	(1)	(35)	(5)	(1)	(8)	(5)	(6)	(3)	(6)	(2)	(1)	(37)	(72)

TABLE 35. UNEMPLOYMENT EXPERIENCE DURING THE CO-OP TRAINING PERIOD

CO-OP PROGRAM	Number of Senior Year School Days Not Employed		
	Mean	Standard Deviation	Number of Students*
Distributive Education, Co-op	6.14	17.44	253
Diversified Cooperative Training	8.23	22.45	134
Cooperative Office Education	11.98	30.70	168
Trade and Industry, Co-op	10.50	20.86	36
Cooperative Work Experience	2.52	4.54	25
Total	8.30	22.86	616

* Number of students for which data was reported.

TABLE 36. FULL-TIME PLACEMENT WITH CO-OP EMPLOYERS AFTER GRADUATION

CO-OP PROGRAM	Did Student Continue Full-Time Employment With Co-op Employer? Yes (%)	No (%)	No Data (%)	Number of Students*
Distributive Education, Co-op	44.1	33.4	22.5	311
Diversified Cooperative Training	46.0	27.3	26.7	187
Cooperative Office Education	45.8	27.4	26.8	179
Trade and Industry, Co-op	61.1	38.9	0.0	36
Cooperative Work Experience	40.0	24.0	36.0	25
Total	45.7	30.4	24.0	738

* Number of students for which data was reported.

Interpretation of Descriptive Analysis

In Table 22 data on junior-year school enrollment were presented. Reviewing these data, the following descriptive facts can be discerned concerning junior-year enrollments for the schools studied.

- For one of the twenty schools, all junior year students were non-co-op vocational students.
- One school had no junior year non-co-op vocational students.
- Five schools had no junior year co-op vocational students.
- Twelve schools had more than fifty percent of their junior students as nonvocational students.
- Five schools had more than fifty percent of their junior year students as non-co-op vocational students.
- For the eighteen schools with nonvocational junior year students, the percentage of such students ranged from a low of 17 percent to a high of 92 percent, with the mean at about 58 percent.
- For the fourteen schools with co-op vocational junior-year students, the percentage of such students ranged from a low of 5 percent to a high of almost 16 percent, with a mean of about 9 percent.
- For the eighteen schools with non-co-op vocational junior year students, the percentage of such students ranged from a low of about 2 percent to a high of 100 percent, with a mean of about 40 percent.
- The junior average daily attendance for all schools was approximately 91 percent of the average junior-year school enrollment.

Similarly, for Table 23, which presents data on the senior-year school enrollment, the following descriptive facts emerge.

- For one of the schools, all senior year students were non-co-op vocational students.
- One school had no senior year non-co-op vocational students.
- With the two exceptions noted above, all other schools had senior-year students in each of the three categories.

- Ten of the schools had more than fifty percent of their senior-year students as nonvocational students.
- Six of the schools had more than fifty percent of their senior-year students as non-co-op vocational students.
- For the eighteen schools with nonvocational senior-year students, the percentage of such students ranged from a low of about 14 percent to a high of about 96 percent, with a mean of about 55 percent.
- For the eighteen schools with co-op vocational senior-year students, the percentage of such students ranged from a low of about 4 percent to a high of about 24 percent, with a mean of about 14 percent.
- For the eighteen schools with non-co-op vocational senior-year students, the percentage of such students ranged from a low of about 2 percent to a high of 100 percent, with a mean of about 37 percent.
- The senior year average daily attendance for all schools was approximately 89 percent of the average senior-year school enrollment.

Looking next at the data in Table 24, the following summary of junior-year school dropouts emerges.

- The average percentage of junior-year students enrolled in nonvocational programs who dropped out of school ranged from 0 percent to 34 percent with a mean of about 9 percent.
- The average percentage of junior-year students enrolled in co-op vocational programs who dropped out of school ranged from 0 percent to 29 percent with a mean of 8 percent.
- The average percentage of junior-year students enrolled in non-co-op vocational programs who dropped out of school ranged from 0 percent to 19 percent with a mean of 5 percent.
- The average percent of junior-year students enrolled in all programs who dropped out of school ranged from about 2 percent to 14 percent with a mean of about 6 percent.
- One school had no junior year dropouts in non-vocational programs; four schools had no junior-year dropouts in co-op vocational programs; four schools had no junior-year dropouts in non-co-op vocational programs.

Table 25 offers similar data on senior-year dropouts with the following results.

- The average percentage of senior-year students enrolled in nonvocational programs who dropped out of school ranged from 0 percent to 30 percent with a mean of 9 percent.
- The average percentage of senior-year students enrolled in co-op vocational programs who dropped out of school ranged from 0 percent to 15 percent with a mean of 4 percent.
- The average percentage of senior-year students enrolled in non-co-op vocational programs who dropped out of school ranged from 0 percent to 40 percent with a mean of 8 percent.
- The average percentage of senior year students enrolled in all programs who dropped out of school ranged from 1 percent to 17 percent with a mean of 6 percent.
- One school had no senior-year dropouts in non-vocational programs; seven schools had no senior-year dropouts in co-op vocational programs; two schools had no senior-year dropouts in non-co-op vocational programs.

As previously noted, the information on dropouts represents the school districts' best estimate of dropouts. Some of the numbers reported may not actually represent students who dropped out of school. The actual dropout rate is probably less than this analysis shows.

Table 26 presents a summary of the racial mix of 16 of the 20 schools studied. For these 16 schools, the average distribution of students by race was the following:

- White, or Caucasian - 93.5%
- Black, Afro-American, or Negro - 6.0%
- American Indian - 0.2%
- Mexican American, or Chicano - 0.2%
- Oriental, or Asian American - 0.1%.

In Table 27, descriptive data are summarized for each of the 14 program areas defined for the study. The average age of co-op vocational programs was 8 years and of non-co-op programs was 10 years, based upon data for 79 of the 83 programs. When the distribution of the ages of the programs was considered, the difference in average age was not statistically significant.

Table 27 indicates that the co-op vocational programs on the average had larger classes of students than non-co-op vocational programs. The average difference of junior-year classes was about 4.4 students per class, and for senior-year classes was about 5.4 students per class. This appears to indicate that co-op programs are amenable to larger classes. This should mean that co-op programs can make more efficient use of resources. However, the cost analysis did not show a definite advantage for co-op programs. This should be studied in more depth.

The distribution by type of student indicated that for junior-year classes, co-op vocational programs handled proportionately more disadvantaged students than the non-co-op vocational programs (12.6 percent for co-op versus 6.2 percent for non-co-op). In senior-year classes, the proportion of disadvantaged students was more closely aligned (9.7 percent for co-op and 7.8 percent for non-co-op).

The proportion of co-op vocational programs with occupational advisory committees was about 10 percent greater than the proportion of non-co-op vocational programs with such committees. This is a substantial difference between the two program types, although both types had relatively high proportions of programs with such committees.

In examining the data in Table 27 relating to admission criteria and prerequisites, a substantial percentage of both types of programs had prerequisites. However, more co-op programs indicate prerequisites (66.7 percent) than non-co-op programs (54.5 percent).

About 36 percent of the vocational programs indicated a minimum grade-point criterion with little difference in this percentage between the two types of programs. The average minimum grade-point standard was slightly lower for co-op vocational programs than for non-co-op vocational programs, but both were in the range of a "C" average for the students.

Only 25 percent of the non-co-op vocational programs indicated a past attendance criterion for admission while almost 72 percent of the co-op vocational programs did. The average minimum standard for the co-op

vocational programs was substantially more stringent than for non-co-op vocational programs (about 21 days of absence in the previous year for co-op versus about 32 days for non-co-op).

Table 28 summarizes additional information on the activities and composition of the occupational advisory committees where they exist. Committees for the two program types did not differ substantially on the frequency of their meetings, their average number of members, their distribution of members, and on the average attendance at meetings. The extent of the committees' activities for the two types of programs did differ, however. For co-op vocational programs, there were only two activities in which more than 50 percent of the committees engage frequently. These were:

- Identifying and reviewing program objectives
- Soliciting employment opportunities for program graduates.

For non-co-op vocational programs, there were five activities in which more than 50 percent of the committees engage frequently. These were:

- Identifying and reviewing program objectives
- Suggesting appropriate learning experiences
- Recommending standards for student performance
- Determining laboratory and shop equipment needs
- Acting as liaison between schools and employers.

The absence of this last activity for co-op programs is surprising since it seems that the advisory committees should be helping with the liaison between schools and employers.

The tabulation of prerequisites in Table 29 is interesting for the items listed, but even more so, for the omissions. For example, in some of the non-co-op vocational program areas where parental approval or minimum age was not indicated as a requirement, this seems injudicious in light of the safety considerations one might expect. These include auto body, machine trades, and welding. Perhaps, this is an oversight due to the way the data item was phrased on the instrument. It may have been the case that some of these requirements should have been stated explicitly on the instrument and, consequently, may not have been reported because the respondent considered them obvious and thus did not list them.

In Tables 30 through 33, data on the average amount of time spent in various types of instruction by a student per week were presented. These averages are further summarized in Table 37 below. These averages indicate what one normally would expect. There was little difference in the total time spent in instruction with the exception of laboratory or shop vocational instruction. The amount of laboratory or shop vocational instruction for non-co-op students was two to three times that for co-op students, which is to be expected since no on-the-job training was provided for the non-co-op students.

Table 34 presented characteristics of a representative sample of graduates from the vocational programs. There was a significant difference in the distribution by sex of graduates in the co-op and non-co-op vocational programs. In the co-op programs, substantially more of the graduates were female than male while in the non-co-op programs, the reverse was true, but this is due to the occupational areas included in each type of program. The proportion of graduates who were non-white was greater for co-op programs than for non-co-op programs. The program types seemed to be approximately equal in terms of the percentage of students who graduated. The difference in absenteeism for the two types of programs seemed minimal.

Table 35 offered a comparison of co-op programs only, with respect to unemployment experiences of students during the co-op training period. The mean number of days of unemployment was relatively small for all program types; however as the standard deviation indicates, the variation was great. These were isolated cases where individual students had difficulty finding placements, but on the whole this does not appear to have been a serious difficulty.

In Table 36, data on the percentage of co-op students continuing full-time employment with their co-op employer after graduation was presented. Considering the various sample sizes by program area, the percentages were not noticeably different among program areas. On the average, about 46 percent of the students for which data were available continued with the same employer. This appears to be a substantially high percentage, which reflects favorably on the co-op vocational programs' usefulness in securing full-time employment after graduation.

TABLE 37. SUMMARY OF AVERAGE WEEKLY HOURS OF INSTRUCTION FOR VOCATIONAL PROGRAMS

	Co-op*	Non-co-op
SENIOR YEAR		
Laboratory or Shop Vocational Instruction	5.5	12.2
Non-laboratory or Non-shop Vocational Instruction	5.1	4.9
Instruction Not Related to Vocational Programs	9.9	7.7
JUNIOR YEAR		
Laboratory or Shop Vocational Instruction	4.3	12.0
Non-laboratory or Non-shop Vocational Instruction	2.9	4.7
Instruction Not Related to Vocational Instruction	11.1	8.0

* This does not include the hours spent in on-the-job training for co-op students.

However, we cannot be sure of the extent to which non-co-op students also continue full-time employment with a part-time employer they might have had before graduation.

In summary, the following significant results were indicated by the descriptive data collected for the twenty schools in this study.

- The average age of the vocational programs was 9 years, with no significant difference between co-op and non-co-op programs.
- The average class size for co-op programs was slightly greater than for non-co-op programs, with an average of 28.5 students for junior-year classes, and 24.7 students for senior-year classes for co-op programs, and an average of 24.1 students for junior-year classes, and 19.3 students for senior-year classes for non-co-op programs. Apparently, co-op programs are amenable to larger class sizes.
- A greater proportion of the co-op programs had an occupational advisory committee (71.8 percent versus 61.4 percent for non-co-op programs), but the proportion is relatively high for both types of programs.
- The occupational advisory committees did not differ significantly by program type on their frequency of meetings, average number of members, distribution of members, or their average attendance at meetings.
- The occupational advisory committees for non-co-op programs seemed to be more actively involved with these programs than were those for co-op programs.
- A substantial proportion of both types of programs had prerequisites and admission criteria (an average of about 60 percent of all programs) with a slightly higher percentage for co-op programs. A significant difference between program types was a past-attendance criterion, which 72 percent of the co-op programs instituted while only 25 percent of the non-co-op programs instituted, and the requirement was more stringent for co-op programs (an average maximum of 21 days absent in the preceding year versus 32 days for non-co-op programs).
- There was little difference between program types in the average hours per week spent by students in instruction, with the exception of laboratory or shop vocational instruction, and the amount of time in the latter was two to three times greater for non-co-op programs than for co-op programs. But the time spent by co-op students in on-the-job training is not included in this comparison of time spent in instruction.

- With respect to junior-year enrollment, fourteen schools had a majority of students enrolled as nonvocational, five schools had a majority of students enrolled as non-co-op vocational, and one school did not report its distribution.

- With respect to senior year enrollment, twelve schools had a majority of students enrolled as nonvocational, seven schools had a majority of students enrolled as non-co-op vocational, and one school did not report its distribution.

- With respect to dropout rates among junior-year students, the average percentage of dropouts based upon enrollment in the program types was 9 percent for nonvocational, 8 percent for co-op vocational, and 5 percent for non-co-op vocational.

- With respect to dropout rates among senior-year students, the average percentage of dropouts based upon enrollment in the program types was 9 percent for nonvocational, 4 percent for co-op vocational, and 8 percent for non-co-op vocational.

- For co-op programs, there appeared to be little difficulty in finding employment for on-the-job training as measured by the amount of time unemployed during the co-op training period.

- A substantial percentage (46 percent) of the co-op students were able to continue employment with their co-op employer after graduation.

- The average distribution by racial mix for all twenty schools studied was 93.5 percent White, or Caucasian; 6.0 percent Black, Afro-American, or Negro; 0.2 percent American Indian; 0.2 percent Mexican American, or Chicano; and 0.1 percent Oriental, or Asian American.

- On the average, co-op programs handled proportionately more disadvantaged students than non-co-op programs in the junior year (12.6 percent for co-op and 6.2 percent for non-co-op), but in the senior year, these proportions were not substantially different (9.7 percent for co-op and 7.8 percent for non-co-op).

- The percentage of handicapped students in these programs was relatively low, ranging from 0.4 percent to 0.8 percent with no substantial differences by type of program.

- In co-op programs, substantially more of the graduates were female than male, while the reverse was true for non-co-op programs.
- The proportion of graduates who were non-white was greater for co-op programs than for non-co-op programs.

As mentioned earlier, since this was an exploratory study, and the schools studied were not selected by a random process, caution should be exercised in attempting to generalize these results to other schools.

SUMMARY AND CONCLUSIONS

The goal of this study was to explore the feasibility of conducting a cost-effectiveness analysis of selected cooperative vocational education programs as compared with vocational programs without a cooperative component. The answer to the question of feasibility must be stated in three parts:

(1) It is possible to collect and analyze historical cost and effectiveness information on selected vocational education programs.

(2) In general, it is not possible to compare directly cooperative programs with those without a cooperative component, since it is unlikely that similar programs are offered using both of the methods.

(3) Cost-effectiveness analysis can be used as one element in policy formulation concerning vocational education methodologies.

This study has shown that school districts can provide information needed to perform cost-effectiveness analyses and that useful information can be displayed to help in policy formulation. However, it is not readily feasible to make a direct comparison of the two methods--co-op versus non-co-op vocational education--within a given program area. Of course, an experiment could be designed to make this direct comparison by either locating those school districts that have used both methods for a given program area, or establishing pilot programs to study the differences.

From the literature, we note that educational leaders advocate work experience as a valuable part of the learning experience. To our knowledge, there have not been any extensive studies to examine the worth of work experience as an integrated part of the educational programming. The following conclusions shed some light on this question. The conclusions are presented relative to the objectives of the study. Each of the following section titles is a statement of one of the study objectives.

Cost Comparisons Between Vocational Programs Utilizing the Cooperative Method and Regular Vocational Programs

Based on the cost data collected, we used two cost measures for analysis purposes--annual cost per student and annual cost per student hour. The annual cost per student measure shows a differential of about $190, favoring co-op programs. This differential is a marginal statistically significant difference. On the basis of cost per student hour, there is a differential of about $8, favoring non-co-op programs. This difference is not statistically significant. There is wide variation in both measures across programs and across schools, but these variations can be explained very well as being a function of the student-teacher ratio. That is, the cost of a program is not a function of the program, nor the method, but the efficiency with which human resources (teachers) are used.

Thus, our overall conclusion, based on this initial study, is that there is no obvious difference in the cost of providing either cooperative vocational education programs or those without a cooperative component.

Effectiveness Comparisons of Various Types of Vocational Programs

The effectiveness comparisons are based mostly on standard follow-up information provided by the schools on graduates of the

vocational programs. In addition, a brief survey of employers was conducted to obtain some attitudes from employers regarding graduates of co-op versus non-co-op programs.

On the basis of school-provided information, we note differences between co-op and non-co-op program graduates as follows:

- Graduates of co-op programs enter the labor market with a lower entry wage rate that increases more rapidly, but graduates of non-co-op programs still earn a higher rate after a follow-up period of 13 to 18 months. It must be remembered that this is probably due more to the occupational area itself and the labor market conditions than to the educational experiences.
- The graduates of non-co-op programs remain with their longest full-time employer slightly longer (one month) than do the graduates of co-op programs; based upon a 13 to 18 month follow-up period. This difference is significant in a statistical sense, but not in a practical sense.
- Graduates of co-op programs tend to find full-time employment slightly faster than their non-co-op counterparts, but the difference is only 1.5 weeks--not a very practical difference.

There was no significant difference between the graduates of co-op programs versus non-co-op programs on the basis of the following measures:

- Those students who successfully graduate
- Unemployment rates
- Those entering the local labor market versus those leaving the local community
- Those graduates who entered formal apprenticeship programs
- Employment stability as measured by the number of different employers after graduation.

Our overall conclusion based on the follow-up measures provided by the schools is that there is no obvious difference (in a practical sense) between graduates of co-op vocational programs and graduates of non-co-op programs. The effect of the occupation itself and the labor market conditions are probably more important than the vocational schooling, or the method used in providing vocational training.

The employer survey very definitely showed a difference. The sample of employers favored graduates of co-op programs (58.6 percent) over those of non-co-op programs (4.2 percent), with 36.6 percent indicating no difference, and 0.6 percent missing data. We must recognize that this sample was small (90 out of 200 employers returned the questionnaire) and that there were some inherent biases that we were unable to control, due to the choice of employers who received the questionnaire. The school districts provided the lists of employers and individuals to whom we sent the questionnaire. We do not think that there was any deliberate attempt to bias the results, but we could not design the survey to uncover any bias, due to the limited scope of this part of the study. Nevertheless, it is important to note that a majority of the sampled employers definitely favor graduates of co-op vocational programs.

Our overall conclusions based on the employer survey are that employers tend to favor graduates of co-op programs and that the process of measuring effectiveness through a questioning of employers results in a much more clear-cut differential between the two methods than does the follow-up information normally collected by school systems.

Identification and Description of the Various Types of Co-op and Non-co-op Vocational Programs Currently Being Conducted

As stated earlier, this exploratory study did not allow for an analysis of all of the possible vocational program offerings that exist across the nation. We had to limit the study to those programs that were most common and most apt to be offered in the limited geographical region that was used. Thus, we have not identified, nor described, the full gamut of vocational programs.

For those programs that were included, we have described them mostly in quantitative terms. The details are included in the section on Descriptive Analysis. The aggregated descriptions for the two types of programs--co-op and non-co-op--show the following.

- The average age of vocational programs was 9 years with no significant difference between co-op and non-co-op programs.
- The average class size for co-op programs was higher than for non-co-op programs, e.g., in the senior year the average was 24.7 for co-op programs and 19.3 for non-co-op programs.
- A greater proportion of co-op programs had occupational advisory committees (71.8 percent for co-op, 61.4 percent for non-co-op), but the proportion is high for both types of programs. The characteristics of the advisory committees did not differ for the two types of programs; however, the committees for non-co-op programs seemed to be more actively involved than those for co-op programs.
- Both types of programs had prerequisite and admissions criteria. Seventy-five percent of the co-op programs used past-attendance records as an admission criterion, while only twenty-five percent of the non-co-op programs included this as an admission criterion. The criterion for co-op programs was more stringent--an average maximum of 21 days absent for the preceding year versus 32 days for non-co-op programs.
- The total number of hours per week spent in instruction was not different for the two types of programs; however, the amount of time spent in in-school vocational training, i.e., both in laboratories and vocationally related instruction, was two to three times greater for non-co-op programs than for co-op programs. The on-the-job training time for co-op students is not included in this comparison.

It is important to keep in mind that the occupational areas for the individual programs is different for the two types of programs. Thus, some of the descriptive information is probably much more a function of the type of occupational training provided and not the method that is used. As an example, the vocational skill training necessitated for an auto mechanic is different from that necessitated for a salesperson. The descriptors that we have provided simply show in quantitative terms those characteristics of the learning experiences that are offered in the programs we studied. We can make no judgments concerning the efficacy of those characteristics.

There are some descriptors relating to enrollment at the school level that add some to describing the programs. That is, the enrollment distributions help to describe the relative sizes of aggregated clusters of students. The following summarizes these enrollment characteristics:

- For enrollment in the junior year, fourteen schools had a majority of students enrolled as nonvocational, five schools had a majority of students enrolled as non-co-op vocational, and one school did not report these data.
- For senior-year enrollment, twelve schools had a majority of students enrolled as nonvocational, seven had a majority of students enrolled as non-co-op vocational, and one school did not report these data.
- The junior year dropout rate was 9 percent for nonvocational, 8 percent for co-op vocational, and 5 percent for non-co-op vocational.
- The senior year dropout rate was 9 percent for nonvocational, 4 percent for co-op vocational, and 8 percent for non-co-op vocational.

Notice that there was no difference between the junior and senior year dropout rate for nonvocational programs, but that the rate decreases from the junior to senior year for co-op programs and increases from the junior to senior year for non-co-op programs. This may be explained by the differences in the screening of students both before the junior year and between the junior and senior year. There may be other reasons for this, but this seems to be a reasonable explanation.

Two descriptors pertain only to the co-op programs:

- There appeared to be little difficulty in finding employment for on-the-job training in the co-op programs.
- A substantial percentage of co-op graduates (46 percent) were able to continue full-time employment with their co-op employer.

These two descriptors tell something about how well the co-op programs fulfill some of their intended purposes, and thus could be considered to be measures of effectiveness. We have included these as

descriptors because of the uncertainty involved in relating these descriptors to longitudinal effects, and because there are no corresponding measures for the non-co-op programs.

Data on the Type of Students in Various Vocational Programs

This section does not refer to the study objective as it was originally stated. The objective was "Obtain data on the type of students in various vocational programs, together with student performance in these programs". The last phrase in that objective overlapped with the objective of "assessing the effectiveness of the various types of programs". This has been covered in detail in the section on Effectiveness Analysis and in this section under effectiveness comparisons.

The detailed information on the types of students in the individual programs is included in the section of Descriptive Analysis. The main aggregated results are as follows:

- The average distribution of race for all twenty schools was 93.5 percent White, or Caucasian; 6.0 percent Black, Afro American, or Negro; 0.2 percent American Indian; 0.2 percent Mexican American, or Chicano; and 0.1 percent Oriental, or Asian American.
- On the average, co-op programs handled proportionately more disadvantaged students than non-co-op programs in the junior year, but the proportions in the senior year were not substantially different.
- The percentage of handicapped students was low in all programs (ranging from 0.4 percent to 0.8 percent) with no substantial difference by type of program.
- Substantially more graduates of co-op programs were female, whi : more graduates of non-co-op programs were male. This is due to the occupations included in the sample of co-op and non-co-op programs.
- The proportion of graduates who were non-white was greater for co-op programs than for non-co-op programs.

These descriptors might show some of the effects that federal legislation has had on the types of students enrolled in various types of vocational programs. We cannot judge the direct effects that the legislation has had, but a further in-depth study, using some of these descriptors, could lead to more concrete indicators of what has happened due to the Vocational Education Act of 1963 and the 1968 Amendments.

Determination of the Present Status of Data Availability for Making Successive In-Depth Analyses

This study shows that it is indeed possible to collect some of the information required for making cost-effectiveness analyses of vocational education programs both with and without cooperative components. The data can be collected at the school district level in the approximate form that we were able to collect it on this study. At this point we cannot be sure whether some of the information could be collected at the state level. We know that in Ohio it will be possible soon to obtain cost information and some effectiveness information at the state level. There are probably other states that are working on this also.

In any event, it is feasible to obtain and analyze information on co-op and non-co-op vocational programs in the cost-effectiveness context. The main source of information is the school district and the individual high schools within the school district.

RECOMMENDATIONS FOR FURTHER IN-DEPTH STUDIES

We recommend that further in-depth studies be conducted to answer questions concerning the cost-effectiveness of co-op vocational education versus non-co-op vocational education. We think that it is important to learn more about the costs and effectiveness of these two methods, but that the questions should be expanded in scope. It seems to us that a very important question concerns the worth, or value, or

benefit of using work experience as part of the learning experience. This is a much broader question that needs to be asked. This exploratory study considered only questions about co-op versus non-co-op vocational education, and the definition of co-op programs was very stringent. We recommend that the scope of any further studies be broadened to include evaluations of Occupational Work Experience programs and any other programs that use on-the-job training as a part of the educational method.

For the purposes of collecting both cost and effectiveness information, it is probably better to assume that the data will be collected at the school district level. Some states, particularly those that are implementing Planning-Programming-Budgeting Systems, may have some data at the state level. However, it would be better to separate any studies at the state level from those conducted at the school district level.

In connection with collecting information from school districts, we consider ourselves fortunate to have been able to do so, without any provision for remuneration to the school districts. Any further studies should definitely include some method for remunerating the school district. Along those lines, it would not be very efficient to use the outside agency as the direct collector of data. The school district personnel can "get to" the information much more efficiently than an outside agency. Thus, we recommend that the data collection procedures be patterned after those used on this study. In addition to visiting the schools to discuss and explain the data collection instruments, we recommend that a personal follow-up be included. That is, after the school districts have completed the instruments as well as possible, a second visit should be made to clarify any questions and attempt to fill in missing information. We feel very strongly that the validity of any conclusions will depend heavily on the data collected at "the point of source". Appendix C explains how the instruments we have designed and implemented can be improved to increase the reliability of the data.

We think that the analysis techniques we have used are consistent with present cost-effectiveness concepts. There may be some analyses that could be added, but the basic components have been provided in the analyses that we have performed.

For future cost analyses, we recommend that data be collected at the level of detail used on this study. There is no need to collect any more specific cost information, and it would not add materially to try to improve the accuracy of the cost elements. These types of cost analyses do not require "bookkeeping" accuracy.

For the effectiveness analyses, we recommend following our outline of possible measures of effectiveness. Appendix C explains those items that we would suggest be modified. However, in the area of effectiveness, we think the scope should be expanded. The typical types of follow-up information do not cover some of the things that should definitely be considered in measuring the effectiveness of any educational program. Namely, it is very important to consider in more detail what happens to the graduate after he enters the labor market, and how the labor market conditions affect what happens to the graduate. Thus, we recommend that in further in-depth studies two new dimensions be added to the effectiveness analysis:

(1) An in-depth survey of employers

(2) An in-depth study of labor market conditions.

The survey of employers should borrow from the experiences of the limited-scope survey used in this study. But this should be expanded to include collection of more objective data on the experiences with employees who come from different educational backgrounds, and also include personal interviews with appropriate personnel in the firms that are surveyed. With regard to labor market conditions, it may be possible to obtain and reanalyze data that are already available, e.g., Department of Labor Statistics, but it probably will be necessary to add to this knowledge through new data collection efforts.

We think that a follow-up, attitudinal survey of graduates would add materially to an in-depth cost-effectiveness analysis. This could be handled as part of a mail-type follow-up survey, but we think it would be more informative to include a sample of personal interviews as a part of the employer survey that we have recommended.

For the descriptive analyses, we recommend using quantitative measures insofar as possible. It is very difficult to assimilate and synthesize information contained in curriculum descriptions. We think that the descriptors that we used are adequate for comparison purposes. Perhaps some additional measures could be added, but we do not recommend spending very much more effort in treating the descriptive differences between programs, or methods.

Finally, the in-depth studies must be broad-based both in terms of covering the full gamut of vocational programs and the differences in geographical influence. Whether or not random sampling is appropriate cannot be judged here. However, it is important to consider more complete sampling than was provided in this exploratory study. Considering the amount of information we were able to collect from twelve school districts, it is probably practical to consider a nationwide sample of 50 school districts. Given the suggestions we have made for expanding the scope this would indeed be a large-scale study, involving several times the effort of this study.

To summarize, our recommendations are:

- That an in-depth study of vocational education programs with cooperative components versus those without cooperative components can and should be conducted
- That the study be directed at the question of what is the efficacy of work experience as an element of the learning experience
- That this exploratory study be used as a model for the in-depth study
- That the effectiveness analysis be expanded to include an in-depth survey of employers and employees and to include an analysis of labor market conditions

- That the in-depth studies be based on a nationwide sample of school districts and include the full gamut of vocational programs
- That some in-depth studies be conducted in selected vocational program areas both with and without cooperative components, if it is impractical to include the full gamut of vocational programs.

We think that this study has set the stage for the more extensive national status study needed as a foundation for policy formulation in the area of career education.

APPENDIX A

DATA COLLECTION INSTRUMENTS AND INSTRUCTIONS

APPENDIX A

DATA COLLECTION INSTRUMENTS AND INSTRUCTIONS

This appendix includes copies of the instruments that were used on this study. These are:

FORM A -- SCHOOL BUILDING COST DATA INSTRUMENT

FORM B -- INDIVIDUAL SCHOOL ENROLLMENT DATA INSTRUMENT

FORM C -- VOCATIONAL PROGRAM COST DATA INSTRUMENT

FORM D -- VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA INSTRUMENT, PART I

FORM E -- VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA INSTRUMENT, PART II

FORM F -- QUESTIONNAIRE FOR EMPLOYERS OF HIGH SCHOOL GRADUATES OF VOCATIONAL EDUCATION PROGRAMS.

The VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA INSTRUMENT is divided into two parts. The first part, FORM D, is used to collect general information on a given program. Part II, FORM E, is used to collect specific information on a sample of graduates who were in the program. This instrument is an integrated, four page document, measuring 14 by 17 inches. Each line is filled out for an individual graduate on the four pages. The Student Name is on the last page and a perforation allows for removing the names before returning the completed instrument.

The instructions pertain to both parts of the VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA INSTRUMENT--FORM D and FORM E.

The employer questionnaire, FORM F, is a four-page, double-sided, folded instrument, that includes the BACKGROUND and INSTRUCTIONS. An example is included of the letter that was used to introduce this questionnaire.

FORM A

OMB # 51-S72017
Approval Expires June 30, 1973

SCHOOL BUILDING COST DATA

NAME OF SCHOOL DISTRICT _____

NAME OF SCHOOL _____

PERSON(S) RESPONDING _____

POSITION OR TITLE _____

SOURCE OF INFORMATION _____

1. BUILDING CONSTRUCTION

	YEAR	COST	SQUARE FOOTAGE
Original Building	_____	$_____	_____ SQ. FT.

2. ADDITIONS AND/OR REMODELING

	YEAR	COST FOR ADDITION	SQUARE FOOTAGE OF ADDITION*	COST FOR REMODELING
First Addition-Remodel**	_____	$_____	_____ SQ. FT.	$_____
Second Addition-Remodel	_____	$_____	_____ SQ. FT.	$_____
Third Addition-Remodel	_____	$_____	_____ SQ. FT.	$_____
Fourth Addition-Remodel	_____	$_____	_____ SQ. FT.	$_____
Fifth Addition-Remodel	_____	$_____	_____ SQ. FT.	$_____

*This column applies only to additions.
**Underline either addition or remodel or both.

INSTRUCTIONS
SCHOOL BUILDING COST DATA

Under Item 1, please indicate the year of completion, the cost of construction and the square footage of the original building.

Under Item 2, please list any building additions and/or major remodeling expenditures. For the additions, please indicate the year of completion, the cost for the addition and the square footage that was added. For major remodeling, please indicate the year of completion, and the cost for the remodeling. Please include only major remodeling. Do not indicate the square footage that was affected by the major remodeling.

There may be some cases in which an addition and a major remodeling were accomplished in a given year under a single general contract. In these cases, indicate the year of completion, the cost for the addition, the square footage of the addition, and the cost of the major remodeling.

FORM B

INDIVIDUAL SCHOOL ENROLLMENT DATA

OMB # 51-S72017
Approval Expires June 30, 1973

NAME OF SCHOOL DISTRICT _____

NAME OF SCHOOL _____

PERSON(S) RESPONDING _____

POSITION OR TITLE _____

SOURCE OF INFORMATION _____

ENROLLMENT ELEMENT	SCHOOL YEAR 1969-70	SCHOOL YEAR 1970-71
1. SENIOR YEAR ENROLLMENT		
a. Nonvocational		
b. Co-op Vocational		
c. Non-co-op Vocational		
d. Total		
2. JUNIOR YEAR ENROLLMENT		
a. Nonvocational		
b. Co-op Vocational		
c. Non-co-op Vocational		
d. Total		
3. SENIOR YEAR DROPOUTS		
a. Nonvocational		
b. Co-op Vocational		
c. Non-co-op Vocational		
d. Total		
4. JUNIOR YEAR DROPOUTS		
a. Nonvocational		
b. Co-op Vocational		
c. Non-co-op Vocational		
d. Total		
5. TOTAL SCHOOL RACIAL MIX		
a. American Indian		
b. Black, or Afro-American, or Negro		
c. Mexican American, or Chicano		
d. Oriental, or Asian American		
e. Puerto Rican		
f. White, or Caucasian		
g. Other		
h. Total School Enrollment		
6. AVERAGE DAILY ATTENDANCE		
a. Senior Year		
b. Junior Year		

INSTRUCTIONS
INDIVIDUAL SCHOOL ENROLLMENT DATA

(1) This form is intended to collect data for the individual schools selected for this study. All data recorded on the form should represent figures that apply only to the students located therein.
(2) The data should represent totals of students as indicated.
(3) School data are requested for two school years--the 1969-70 school year, and the 1970-71 school year.
(4) Enrollment data should be based on membership.
(5) Following is the list of the items of information requested with definitions as necessary which apply to the items. For further guidance, please follow the definitions presented in OE-23035, Pupil Accounting for Local and State School Systems, prepared by the Office of Education, U.S. Department of Health, Education, and Welfare.

DEFINITIONS

Senior Year Enrollment

Nonvocational. The membership of senior students enrolled in non-vocational programs.

Co-op Vocational. The membership of senior students enrolled in co-op vocational education programs.

Non-Co-op Vocational. The membership of senior students enrolled in non-co-op vocational education programs.

Junior Year Enrollment

Nonvocational. The membership of junior students enrolled in non-vocational programs.

Co-op Vocational. The membership of junior students enrolled in co-op vocational education programs.

Non-Co-op Vocational. The membership of junior students enrolled in non-co-op vocational education programs.

Senior Year Dropouts

Nonvocational. The number of senior students enrolled in non-vocational education programs who dropped out of school.

Co-op Vocational. The number of senior students enrolled in co-op vocational education programs who dropped out of school.

Non-Co-op Vocational. The number of senior students enrolled in non-co-op vocational education programs who dropped out of school.

Junior Year Dropouts

Nonvocational. The number of junior students enrolled in non-vocational education programs who dropped out of school.

Co-op Vocational. The number of junior students enrolled in co-op vocational education programs who dropped out of school.

Non-Co-op Vocational. The number of junior students enrolled in non-co-op vocational education programs who dropped out of school.

Total School Racial Mix

Enter the best estimate of the total students in the school who are considered by themselves, the school, or the community to be in one of the following categories:

(a) American Indian

(b) Black, or Afro-American, or Negro

(c) Mexican American, or Chicano

(d) Oriental, or Asian American

(e) Puerto Rican

(f) White, or Caucasian

(g) Other--not included in the above list.

The total of these categories should be the total student population (membership) in the school.

Average Daily Attendance

Senior Year. The aggregate days attendance of the seniors of the school during the year indicated, divided by the number of days school was in session.

Junior Year. The aggregate days attendance of the juniors of the school during the year indicated, divided by the number of days school was in session.

FORM C

OMB # 51-S72017
Approval Expires June 30, 1973

VOCATIONAL PROGRAM COST DATA

NAME OF SCHOOL DISTRICT _____

NAME OF SCHOOL _____

PERSON(S) RESPONDING _____

POSITION OR TITLE _____

SOURCE OF INFORMATION _____

PROGRAM TITLE _____ PROGRAM CODE* _____

PROGRAM TYPE: ☐ Co-op Program ☐ Non-Co-op Program

INSTRUCTIONAL COST ELEMENT	SCHOOL YEAR 1969-70	1970-71
1. VOCATIONAL INSTRUCTIONAL PERSONNEL		
a. Number of Teachers*	_____	_____
b. Total Teachers' Salaries	$_____	$_____
c. Number of Teachers' Aides*	_____	_____
d. Total Teachers' Aides' Salaries	$_____	$_____
2. PERSONNEL FRINGE BENEFITS**	$_____	$_____
3. INSTRUCTORS' MILEAGE EXPENSE-TRANSPORTATION	$_____	$_____
4. CONSUMABLE SUPPLIES AND MATERIAL COSTS***	$_____	$_____
5. LABORATORY EQUIPMENT RENTAL COSTS	$_____	$_____
6. LABORATORY EQUIPMENT CONTRACT REPAIR COSTS	$_____	$_____

*Full-time equivalent.

**Include retirement contributions, workmen's compensation, disabled workmen's relief, and other benefits, based upon full-time equivalent.

***Audio-visual materials, textbooks, reference books, periodicals, and other instructional material, chargeable to the program.

7. ESTIMATE OF LABORATORY EQUIPMENT REPLACEMENT COSTS:

	LOWEST ESTIMATE	AVERAGE ESTIMATE	HIGHEST ESTIMATE
Total Replacement Cost of All Equipment	$_____	$_____	$_____

8. SQUARE FEET OF LABORATORY AREA(S) USED SOLELY BY THE PROGRAM ____ SQ. FT.

9. BUILDING SPACE SHARED WITH OTHER PROGRAMS

a. Square Feet of Area(s) Shared with Other Programs ____ SQ. FT.

b. Percent of Time Shared Facilities are Used by This Program ____ %

c. Percent of Time Shared Facilities are not Used (Vacant) ____ %

*U.S.O.E. Vocational-Technical Instructional Program Code.

INSTRUCTIONS
VOCATIONAL PROGRAM COST DATA
INSTRUMENT

(1) This form is intended to collect data for a specific vocational education program selected for this study. The vocational program should include both the 11th and 12th grade components, unless there is a specific reason for excluding the 11th grade component (e.g., the 11th grade component is prevocational, rather than vocational). In the case of co-op programs, include the 11th grade component if it is vocational, even though the students receive all their training in school.

(2) Please list totals rather than averages for the instructional cost elements in the data instruments.

(3) Personnel benefits may be reported as percentages to be applied to the total salaries if this is a more convenient format.

(4) For consumable supplies and material costs, budget appropriation figures may be reported rather than actual costs, if more convenient. Please indicate that a budget appropriation figure was used by making an asterisk by number 4.

(5) If equipment is shared by several vocational programs, it should be included only for the program for which it was primarily intended. If some question exists as to which program should be charged, please attach a separate sheet commenting on the shared equipment, and provide details as to how it is utilized by the programs.

(6) Please include the total estimated replacement cost for all equipment, regardless of how it would be obtained (such as school purchases, surplus donations, private industry donations, or school purchases supported by matching funds).

(7) The total square footage of building space used by the vocational education program should be divided between items 8 and 9a.

(8) Please indicate the approximate percentage of time a shared facility is used for this program, and the approximate percentage of time it is unused in items 9b and 9c, respectively.

(9) Following is a list of the items of information requested with definitions as necessary which apply to them.

DEFINITIONS

Vocational Instruction Personnel

Number of Teachers. The number of staff members performing assigned professional activities in guiding and directing the learning experiences of pupils in the specific vocational program under consideration. Full-time equivalents are to be used.

Total Teachers' Salaries. The total amount of salaries paid teachers in the specific vocational program under consideration.

Number of Teachers' Aides. The total number of staff members assigned to the specific vocational program who perform assigned activities of a non-teaching nature. Full-time equivalents are to be used.

Total Teachers' Aides' Salaries. The total amount of salaries paid teachers' aides assigned to the specific vocational program.

Personnel Benefits

The charges incurred for the various employment benefits provided to the instruction personnel including retirement contributions, workmen's compensation, disabled workmen's relief, professional meeting expenses, etc. These benefits may be expressed as dollar expenses or percentages to be applied to total salaries.

Instructors' Mileage Expenses

The travel expenses of teachers assigned to the specific vocational program in the performance of their duties within the school district.

Consumable Supplies and Material Costs

The expenses incurred for the purchase of audio visual materials, textbooks, library books, periodicals, and other instructional material for the specified vocational program. Equipment costs should not be included.

Laboratory Equipment Rental Costs

The cost of any equipment procured on a lease or rental basis for use in the specified vocational program.

Laboratory Equipment Contract Repair Costs

The cost of any contracted repair work incurred on the equipment used in the specified vocational program.

Laboratory Equipment Replacement Costs

The cost of replacing equipment with another of new material of like kind and quality at the present time and place.

Square Feet of Laboratory Area(s) Used Solely by the Program

The square footage of the floor area measured between the principal wall faces at or near floor level, plus wall case or alcove spaces, or both, opening into and designed to serve the laboratory, which is not shared with other programs in the school.

Building Space Shared with Other Programs

Square Feet of Area(s) Shared with Other Programs. The square footage of the floor area measured between the principal wall faces at or near floor level, plus wall case or alcove spaces, or both, opening into and designed to serve the activity carried on in the area, which is shared by the vocational education program being studied and other programs in the school.

Percent of Time Shared Facilities are Used by this Program. The portion of the school week that the shared facilities are used by the vocational education program being studied.

Percent of Time Shared Facilities are not Used (Vacant). The portion of the school week that the shared facilities are not used by any of the programs in the school which share the facility with the vocational education program being studied.

FORM D

OMB # 51-S72017 ,
Approval Expires June 30, 1973

VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA, PART I

NAME OF SCHOOL DISTRICT _____

NAME OF SCHOOL _____

PERSON(S) RESPONDING _____

POSITION OR TITLE _____

PROGRAM TITLE _____ PROGRAM CODE* _____

PROGRAM TYPE: ☐ Co-op Program ☐ Non-Co-op Program

YEAR PROGRAM WAS FIRST INITIATED _____
(School Year)

	SCHOOL YEAR 1969-70 Juniors	1970-71 Seniors
1. PROGRAM ENROLLMENTS		
a. Total Students		
b. Number of Regular Students		
c. Number of Disadvantaged Students		
d. Number of Handicapped Students		
2. SCHEDULE FOR 11TH GRADE STUDENTS (For the 1969-70 School Year)		
NON-CO-OP PROGRAM		
a. Average Number of Hours Per Week in Laboratory or Shop Vocational Instruction**		
b. Average Number of Hours Per Week in Non-Laboratory or Non-Shop Vocational Instruction		
c. Average Number of Hours Per Week in Instruction Not Related to the Vocational Program		

*U.S.O.E. Vocational-Technical Instructional Program Code.

**Laboratory or shop hours are defined as those hours the students spend in practicing the skills associated with the vocational area.

CO-OP PROGRAM

d. Average Number of Weeks of In-School Instruction Per School Year _____

e. Average Number of Hours Per Week in Laboratory or Shop Vocational Instruction, During In-School Instruction _____

f. Average Number of Hours Per Week in Non-Laboratory or Non-Shop Vocational Instruction, During In-School Instruction _____

g. Average Number of Hours Per Week in Instruction Not Related to the Vocational Program, During In-School Instruction _____

h. Average Number of Weeks of On-the-Job Training Per School Year _____

i. Average Number of Working Hours Per Week, During the On-the-Job Training Period _____

j. Average Number of Hours Per Week Spent in Coordination (Teacher Coordinator) _____

3. SCHEDULE FOR 12TH GRADE STUDENTS (For the 1970-71 School Year)

NON-CO-OP PROGRAM

a. Average Number of Hours Per Week in Laboratory or Shop Vocational Instruction* _____

b. Average Number of Hours Per Week in Non-Laboratory or Non-Shop Vocational Instruction _____

c. Average Number of Hours Per Week in Instruction Not Related to the Vocational Program _____

CO-OP PROGRAM

d. Average Number of Weeks of In-School Instruction Per School Year _____

*Laboratory or shop hours are defined as those hours the students spend in practicing the skills associated with the vocational area.

e. Average Number of Hours Per Week In Laboratory or Shop Vocational Instruction, During In-School Instruction _____

f. Average Number of Hours Per Week in Non-Laboratory or Non-Shop Vocational Instruction, During In-School Instruction _____

g. Average Number of Hours Per Week in Instruction Not Related to the Vocational Program, During In-School Instruction _____

h. Average Number of Weeks of On-the-Job Training Per School Year _____

i. Average Number of Working Hours Per Week, During the On-the-Job Training Period _____

j. Average Number of Hours Per Week Spent in Coordination (Teacher Coordinator) _____

4. DOES THE PROGRAM HAVE AN OCCUPATIONAL ADVISORY COMMITTEE?

Yes ☐ No ☐

If "yes":

a. How Frequently Does the Advisory Committee Meet? _____

b. How Many Members Serve on the Advisory Committee? _____

c. How Many Non-School Members Serve on the Committee? _____

d. How Many Union/Labor Representatives Are on the Committee? _____

e. What is the Average Attendance for the Meetings? _____

f. The Committee:

	Frequently	Occasionally	Seldom	Never
(1) Identifies/Reviews Program Objectives	____	____	____	____
(2) Suggests Appropriate Learning Experiences	____	____	____	____
(3) Recommends Standards for Student Performance	____	____	____	____

	Frequently	Occasionally	Seldom	Never
(4) Determines Lab/Shop Equipment Needs	____	____	____	____
(5) Assesses Local Labor Market Needs	____	____	____	____
(6) Solicits Employment Opportunities for Program Graduates	____	____	____	____
(7) Acts As a Liaison Between School and Employers	____	____	____	____
(8) Participates in Public-Relations Activities	____	____	____	____

5. WERE THERE PREREQUISITES OR SELECTION REQUIREMENTS FOR STUDENTS ENTERING THE PROGRAM?

Yes ☐ No ☐

If "yes":

a. List Subject or Course Prerequisites for Entering the Program

(1) _____ (3) _____

(2) _____ (4) _____

b. Was the Grade Point Average Used as a Selection Criterion?

Yes ☐ No ☐

If "yes":

Minimum Student Grade Point Average Required for Admission to the Program _____

c. Was an Aptitude Test(s) Used as a Selection Criteria?

Yes ☐ No ☐

If "yes":

Minimum Score Required for Admission was _____ on _____ test.

Minimum Score Required for Admission was _____ on _____ test.

d. Was a Student's Past History of Attendance a Factor for Admission to the Program?

Yes ☐ No ☐

If "yes":

What were the Minimum Standards of Acceptability? _____

FORM E

OMB = 51-S72017
Approval Expires June 30, 1973

VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA

PART II

Name of School

Vocational Program

STUDENT BASELINE DATA
(1970-71 Graduating Class)

	(1)	(2)	(3)	(4)		(5)			(6)							
						IQ			Program Aptitude or Achievement Test(s) Result(s)							
Student	Sex*	Race**	Graduated***	Total Days Absent 1969-70	Total Days Absent 1970-71	Name of Test	Score	Year of Test	Name of Test	Score	Name of Test	Score	Name of Test	Score
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														

*M – Male, F – Female
**See Instructions Define as per Civil Rights Classification Code – American Indian (AI), Black (B), Mexican American (MA), Oriental (O), Puerto Rican (PR), White (W) Other (OR)
***Y for Yes, N for No

2

FORM E

FOLLOW-UP DATA FOR 1970-71 GRADUATES, NOT-WORKING INFORMATION

The follow-up data is based on a period following the 1971 graduation of

☐ 3 to 6 months ☐ 7 to 12 months ☐ 13 to 18 months

(7) (8)

Student	NOT AVAILABLE FOR EMPLOYMENT								CURRENTLY UNEMPLOYED*
	Entered Military Service	Continued Post-Secondary School					Family Responsibilities	Other	
		4 Year College	Full Time 2 Year Community or Jr. College	Technical School	Other	Post Secondary Major			
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

*Indicate the total number of weeks unemployed since graduation

Use a question mark if unknown

3

FORM E

FOLLOW-UP DATA FOR 1970-71 GRADUATES, EMPLOYMENT INFORMATION

Student	(9) Name of Entry Payroll Title	(10) Entry Wage Rate Per Hour	(11) No. of Weeks Following Graduation Before Gaining Full-Time Employment	(12) No. of Different Employers Since Graduation	(13) Length of Longest Employment (Months)	(14) Major Reason for Leaving Last Job	(15) Highest Skill Level Attained Since Graduation	(16) Most Recent Wage Rate Per Hour	(17) Admitted to a Formal Apprenticeship Program: Yes	(17) Admitted to a Formal Apprenticeship Program: No	(18) Initial Employment: Within Local Labor Market Area	(18) Initial Employment: Outside Local Labor Market Area But Within State	(18) Initial Employment: Outside of State	(19) Most Recent Employment: Within Local Labor Market Area	(19) Most Recent Employment: Outside Local Labor Market Area But Within State	(19) Most Recent Employment: Outside of State
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																
25																

4

FORM E

CO-OP STUDENT ON-THE-JOB TRAINING DATA

(Senior Students Only, 1970-71 School Year)

Student	(20) Program Code*	(21) Type of Job	(22) No. of School Days During Senior Year Student Not Employed	(23) Did Student Continue Full-Time Employment With Cooperative Employer After Graduation Yes / No	Student	STUDENT NAME (REMOVE AFTER COMPLETING FORM)
1					1	
2					2	
3					3	
4					4	
5					5	
6					6	
7					7	
8					8	
9					9	
10					10	
11					11	
12					12	
13					13	
14					14	
15					15	
16					16	
17					17	
18					18	
19					19	
20					20	
21					21	
22					22	
23					23	
24					24	
25					25	

*U.S.O.E. Vocational Technical Instructional Program Code

INSTRUCTIONS
VOCATIONAL PROGRAM DESCRIPTIVE AND EFFECTIVENESS DATA INSTRUMENT

A complete set of the instrument is to be completed for each vocational program used in the study. The vocational program should include both the 11th and 12th grade components, unless there is a specific reason for excluding the 11th grade component (e.g., the 11th grade component is pre-vocational, rather than vocational). In the case of co-op programs, include the 11th grade component if it is vocational, even though the students receive all their training in school. The instruments specify for various items the specific group of students and school year for which data is required. Please follow the specifications for each of the items.

The numbering of the following instructions corresponds directly to the first five items of the instrument.

1. a. Total enrollment of the juniors in the program in the 1969-70 school year, and total enrollment of the seniors in the program in the 1970-71 school year.

   b. Total number, as in 1. a., of nondisadvantaged and nonhandicapped students.

   c. Total number, as in 1. a., of diasdvantaged students. The vocational education definition of a disadvantaged student should be used.

   d. Total number, as in 1. a., of handicapped students. The term "handicapped" as defined by Federal legislation includes: the mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, crippled, or other health-impaired children who by reason thereof require special education and related services.

NOTE--The total enrollment shown in 1. a. should be the sum of 1. b., 1. c., and 1. d. If there were students who were both disadvantaged and handicapped, please include these under handicapped. Place an asterisk by the number to show that you have included some students who were both disadvantaged and handicapped.

2. This item pertains to the schedules that were in effect for the juniors during the 1969-70 school year. Items 2. a. through 2. c. pertain to the NON-CO-OP programs only. In all cases, a week is defined as a school week--usually five days.

   a. Record the average hours per week students spent in the laboratory or shop phase of the non-co-op vocational program. The laboratory or shop hours are defined as the hours the non-co-op students spend in specialized facilities practicing the skills associated with the vocational area.

   b. Record the average hours per week the non-co-op students spent in nonlaboratory or non-shop vocational instruction. These instructional hours should be those directly related to the non-co-op vocational program, e.g., machine tool theory, business English, etc.

   c. Record the average hours per week the non-co-op students spent in instruction not related to the vocational program, e.g., social studies, English, non-vocational mathematics, physical education, driver education, etc.

Items 2. d. through 2. j. pertain to CO-OP programs only.

2. d. Record the average number of weeks per year of in-school instruction. For juniors this is most probably the total number of weeks in the school year.

   e. Record the average number of hours per week the co-op students spent in laboratory or shop vocational instruction during the in-school phase of the co-op program.

   f. Record the average number of hours per week the co-op students spent in non-laboratory or non-shop vocational instruction during the in-school

phase of the co-op program. These hours are those directly related to the vocational program.

g. Record the average number of hours per week the co-op students spent in instruction not related to the vocational program.

h. Record the average number of weeks per year the co-op students spent in on-the-job training. If the juniors did not experience on-the-job training, enter NONE.

i. Record the average number of working hours per week the co-op students spent during the on-the-job training period. If the juniors did not experience on-the-job training, enter NONE.

j. Record the average number of hours per week the teacher-coordinator spent coordinating and supervising the on-the-job training experiences of the co-op students. If the juniors did not experience on-the-job training, enter NONE.

3. This item pertains to the schedules that were in effect for the seniors during the 1970-71 school year. Follow the same instructions used in 2. above. The exceptions that were stated for the junior co-op students should not apply for this item.

4. This item pertains to the occupational advisory committees that are usually associated with vocational programs. If there is an advisory committee, respond to this item on the basis of conditions that existed during the 1970-71 school year.

5. This item pertains to prerequisite or selection requirements for the program. If there were criteria for admitting students, please respond on the basis of the criteria that were in existence for the June 1971 graduates, at the time they entered the program.

5.a. List subject prerequisites, e.g., algebra, industrial arts, general business, etc.

b. List grade point requirements on a 4.0 scale.

c. List aptitude test score(s) and the name of the specific test(s).

d. List attendance standard, e.g., no more than 20 days absent during the sophomore year, absent not more than 10 percent of the time during grades 7 through 10.

The remainder of this form is a set of tables for recording items of information on individual students who were in the program and graduated in June, 1971. All of this data should be entered from data files available in the school district.

The tables allow for recording information for up to 25 students in each program. If there were more than 25, please use the first 25 taken alphabetically.

This set of tables includes four pages. They are to be completed as though they were one continuous table. That is, the information for the first student should pertain to that student for the entire four pages.

The tables are divided into four parts:

-- STUDENT BASELINE DATA (first page)

-- FOLLOW-UP DATA FOR 1970-71 GRADUATES, NOT-WORKING INFORMATION (second page)

-- FOLLOW-UP DATA FOR 1970-71 GRADUATES, EMPLOYMENT INFORMATION (third page)

-- CO-OP STUDENT ON-THE-JOB TRAINING DATA (fourth page).

The following instructions apply to each of these parts.

Student Baseline Data. This data should be completed for each student.

-- Column (1) requires an M for male or F for female.

-- Column (2) requires an indication of race. Race is defined by the following Civil Rights Classification: Enter the best estimate of the student who is considered by himself, the school, or the community to be in one of the following categories:

- American Indian
- Black, or Afro-American, or Negro
- Mexican American, or Chicano
- Oriental, or Asian American
- Puerto Rican
- White, or Caucasian
- Other--not included in the above list.

-- Column (3) requires an indication of whether the student graduated; Y for yes, N for no.

-- Column (4) requires an entry of days absent for each student.

-- Column (5) requires the name, score, and year of the most recent I.Q. test given the student.

-- Column (6) requires the name of the latest aptitude or achievement tests given the student and the score on each test.

Follow-up Data for 1970-71 Graduates, Non-Working-Information. This information would apply only to graduates not working at the time of the follow-up. The respondent should check the appropriate box at the top of the page to indicate the period of the follow-up.

-- Column (7) requires a check in the appropriate column, except for the Post-Secondary Major which requires a written entry.

-- Column (8) requires either a number indicating the number of weeks unemployed, or a question mark.

Follow-up Data for Graduates, Employment Information. This information would apply only to graduates who were working at the time of the follow-up. If for a given student the previous section was completed (Not-Working-Information), then this section would be left blank and vice versa.

-- Column (9) requires the D.O.T. payroll title that most accurately describes the initial or entry employment position, e.g., Clerk Typist I, Auto Mechanics Helper, Machine Tool Operator I, etc.
-- Columns (10) through (13) are self-explanatory.
-- Column (14) requires a brief indication of the reason for leaving the last job, e.g., better job, returned to school, layed off, etc.
-- Column (15) requires an indication of the highest skill level obtained, e.g., final copy typing, receptionist, front-end alignment, set-up work, etc.
-- Columns (16) and (17) are self-explanatory.
-- Columns (18) and (19) require a check in the appropriate column.

Co-op Student On-The-Job Training Data. This information would apply only to Co-op programs. This should be completed for each Co-op student.

-- Column (20) requires the appropriate U.S.O.E. Vocational-Technical Instruction Program Numerical Code.
-- Column (21) requires a brief description of the type of job the co-op student had during his on-the-job training, e.g., auto-mechanic, clerk-stenographer, shoe salesman, etc.
-- Column (22) requires the number of days the co-op student was not placed on an on-the-job training station during the co-op period. This refers to the time lag between changing jobs, or possibly the lapse of days between the start of the school year and the student's initial placement.
-- Column (23) requires a check under the appropriate answer. This refers to the student's initial full-time employment. Answer "yes", even if the student changed jobs later, but began full-time employment with his co-op employer.

November 10, 1972

Battelle
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201
Telephone (614) 299-3151
Telex 24-5454

The U.S. Office of Education is sponsoring an exploratory study to collect and analyze preliminary information about the costs and effectiveness of some high school vocational education programs. Specifically, the study is designed to compare vocational programs utilizing the cooperative (co-op) training method with programs that are conducted totally within the school setting (non-co-op).

The Columbus Laboratories of Battelle Memorial Institute is conducting the study and _____ Schools is one of four districts in _____ that is participating in the study. As one part of the study, we are seeking information from some local firms who have hired graduates of this school district's vocational program.

We have met with the Director of Vocational Education of _____ _____ Schools, Mr. _____. He and other members of the district staff are providing us with some of the cost and effectiveness information needed for the study. Mr. _____ furnished us a list of local firms that he believes are vitally interested in the vocational education programs. Your firm is one of those listed, and therefore we are requesting your assistance in providing information for this important study.

Enclosed is a brief questionnaire. Please read the background and instructions before completing it. The questionnaire should be returned to Battelle in the self-addressed, stamped envelope by December 1, 1972.

Thank you for your assistance.

Sincerely,

Dan Molnar

Daniel E. Molnar
Senior Systems Analyst
Educational Systems Group

DEM:ms
Enclosure

OMB #51-S72017
Approval Expires June 30, 1973

QUESTIONNAIRE FOR EMPLOYERS OF HIGH SCHOOL GRADUATES OF VOCATIONAL EDUCATION PROGRAMS

BACKGROUND

The Columbus Laboratories of Battelle Memorial Institute, Columbus, Ohio, is conducting a research study under contract with the Department of Health, Education, and Welfare, U.S. Office of Education. The title of the study is, "Cost Effectiveness of Selected Cooperative Vocational Education Programs as Compared With Vocational Programs Without a Cooperative Component". This is an exploratory study designed to gain preliminary comparisons of the cost and effectiveness of the two methods of vocational education – co-op and non-co-op. As a part of the study, we want to learn some things concerning the effectiveness of the two methods, as perceived by a sample of employers who have hired graduates of vocational programs. Your help in completing the enclosed brief questionnaire will be greatly appreciated.

INSTRUCTIONS

This is an opinion-type questionnaire that does not require that you examine any historical information. You should complete the questionnaire based on your general impressions and experiences. There are no right, or wrong answers to the questionnaire.

In filling out the questionnaire, you should think in terms of your firm's experiences over about the last two years involving new employees who were high school graduates of our school district's vocational education programs. You should attempt to distinguish between the experiences with graduates of co-op vocational programs and graduates of non-co-op programs. In the case of graduates of co-op vocational programs, you should not be limited to employees who may have had their co-op work experiences with your firm. Rather, you should consider the experiences with graduates of co-op programs, regardless of where they might have gained their co-op experiences.

For the purposes of filling out this questionnaire, you should consider the following definitions:

- Vocational education is defined to include only high school programs -- usually the junior and/or senior years. A vocational program is intensive occupational preparation for a specific occupational objective, or a cluster of occupations and should not be confused with industrial arts programs which are more exploratory in nature.

- Co-op vocational education is defined to include the following characteristics:

  -- The co-op student is involved in a productive employment situation directly related to his vocational objective.

  -- There is a training plan for each co-op student.

- There is at least one period of in-school instruction directly related to the student's vocational objective.

- There is available a school-employed coordinator with adequate time for on-the-job supervision of the co-op student.

- Non-co-op vocational education programs are those that provide vocational training totally within the school environment.

We are interested in obtaining general impressions and experiences about the differences between new hirees who have graduated from high school co-op vocational programs versus non-co-op vocational programs. The questionnaire is divided into three main categories:

(1) the organization's hiring and training experiences

(2) the organization's general experience with new employees during the first 6 months of employment

(3) the organization's experience with new employees after 6 months of employment.

Please check either CO-OP, or NON-CO-OP or the neutral answer for each question. We repeat, there are no right, or wrong, answers to this questionnaire, so please attempt to answer each item.

Return this questionnaire to Battelle's Columbus Laboratories as soon as possible in the self-addressed, stamped envelope. Thank you for your help.

NAME OF FIRM _____

ADDRESS OF FIRM _____
(Street) (City) (State) (Zip)

MAJOR PRODUCT OR SERVICE OF FIRM _____

NUMBER OF EMPLOYEES _____ TODAY'S DATE _____

NAME OF RESPONDENT _____

POSITION OR TITLE _____

Please place a check in one of the three boxes that is most appropriate for each item.

* * * * * * * *

QUESTIONNAIRE ITEM	High School Graduates of CO-OP Vocational Programs	High School Graduates of NON-CO-OP Vocational Programs	No Significant Difference
HIRING AND TRAINING EXPERIENCES			
1. Generally, the proportion* hired of those who apply is greater in the case of . . .	☐	☐	☐
2. Generally, the entry level wage is higher in the case of . . .	☐	☐	☐
3. Generally, the period of initial training is less in the case of . . .	☐	☐	☐
4. Generally, the cost of initial training is less in the case of . . .	☐	☐	☐
EXPERIENCE DURING THE ADJUSTMENT PERIOD OF EMPLOYMENT (First 6 Months)			
5. Generally, the overall quantity of production or service is greater in the case of . . .	☐	☐	☐
6. Generally, the overall quality of work is better in the case of . . .	☐	☐	☐

*Example – If the firm has interviewed about 50 graduates of CO-OP programs and hired about 25 (50%), and interviewed about 100 graduates of NON-CO-OP programs and hired about 10 (10%), then the first box would be checked.

CONTINUE ⟶

QUESTIONNAIRE ITEM	High School Graduates of CO-OP Vocational Programs	High School Graduates of NON-CO-OP Vocational Programs	No Significant Difference
7. Generally, the motivational characteristics are better in the case of . . .	☐	☐	☐
8. Generally, the work habits are better in the case of . . .	☐	☐	☐
9. Generally, the manipulative skills are better in the case of . . .	☐	☐	☐
10. Generally, the human relations skills are better in the case of . . .	☐	☐	☐
11. Generally, the conceptual skills are better in the case of . . .	☐	☐	☐
12. Generally, the average absentee rate is less in the case of . . .	☐	☐	☐
13. Generally, the average proportion of dismissals is less in the case of . . .	☐	☐	☐
JOB PERFORMANCE AFTER THE FIRST 6 MONTHS OF EMPLOYMENT			
14. Generally, the overall quantity of production or service increases more rapidly in the case of . . .	☐	☐	☐
15. Generally, the overall quality of work increases more rapidly in the case of . . .	☐	☐	☐
16. Generally, the average wage increases more rapidly in the case of . . .	☐	☐	☐
17. Generally, the average proportion of dismissals is less in the case of . . .	☐	☐	☐

Comments:

APPENDIX B

DETAILED RESULTS OF EMPLOYER SURVEY

APPENDIX B

DETAILED RESULTS OF EMPLOYER SURVEY

This appendix contains the distribution of responses for each item of the employer questionnaire. It contains seventeen figures, one for each item on the questionnaire. The results are displayed as histograms for each category of response--graduates of co-op programs are favored; graduates of non-co-op programs are favored; no difference.

The number in parentheses on the figures indicates the number of responses. This is followed by the percentage of total responses for the category.

A copy of the employer questionnaire is included in Appendix A.

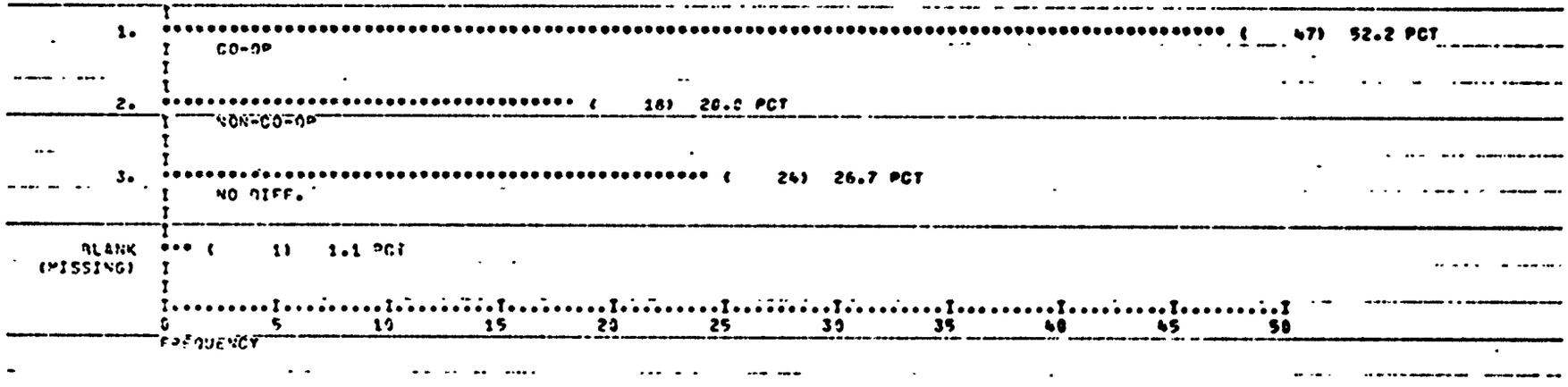

FIGURE B-1. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 1 -- THE PROPORTION HIRED OF THOSE WHO APPLY IS GREATER IN THE CASE OF ...

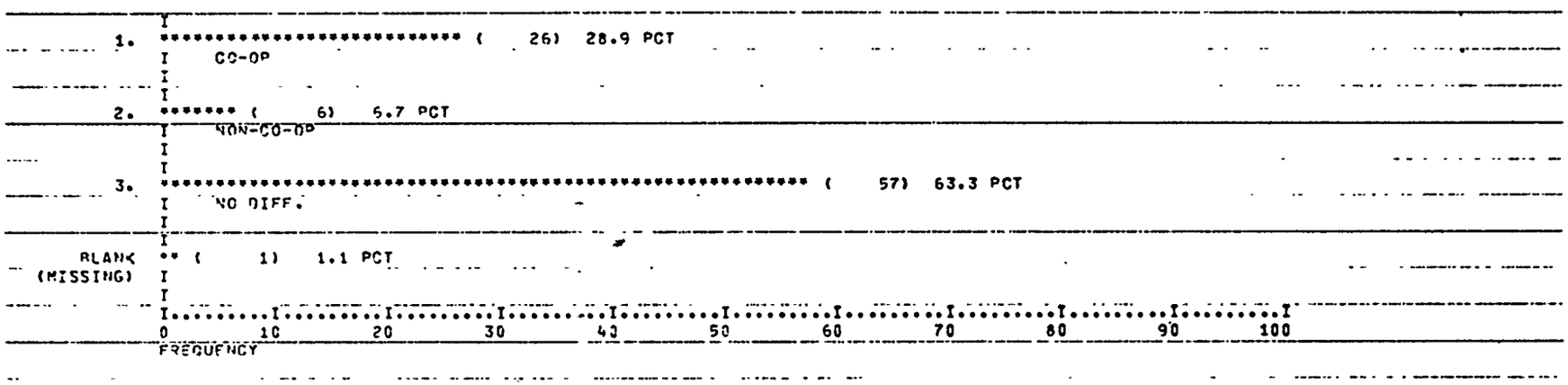

FIGURE B-2. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 2 -- THE ENTRY LEVEL WAGE IS HIGHER IN THE CASE OF...

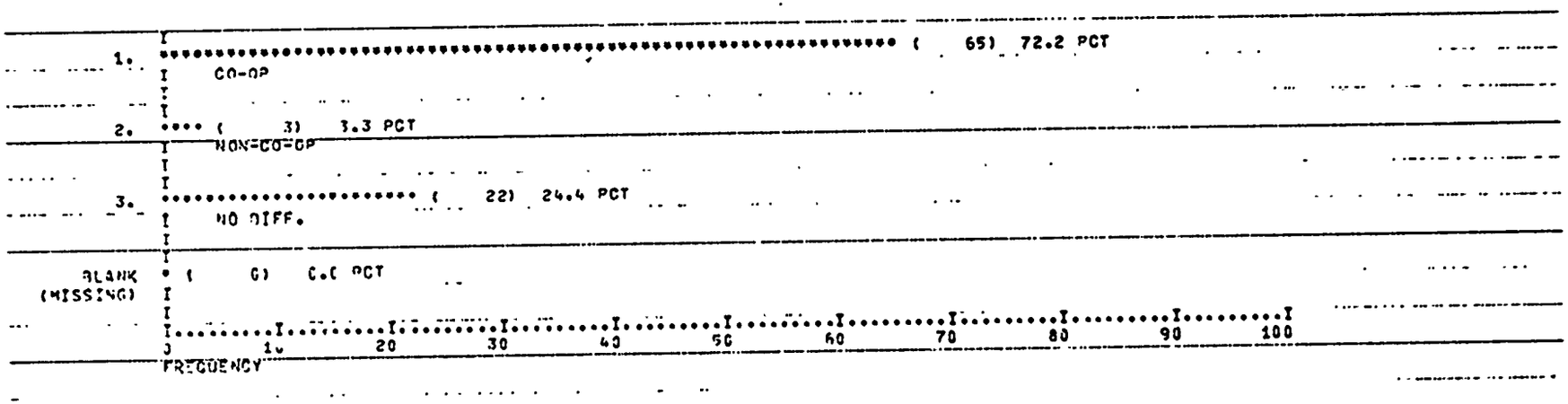

FIGURE B-3. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 3 -- THE PERIOD OF INITIAL TRAINING IS LESS IN THE CASE OF...

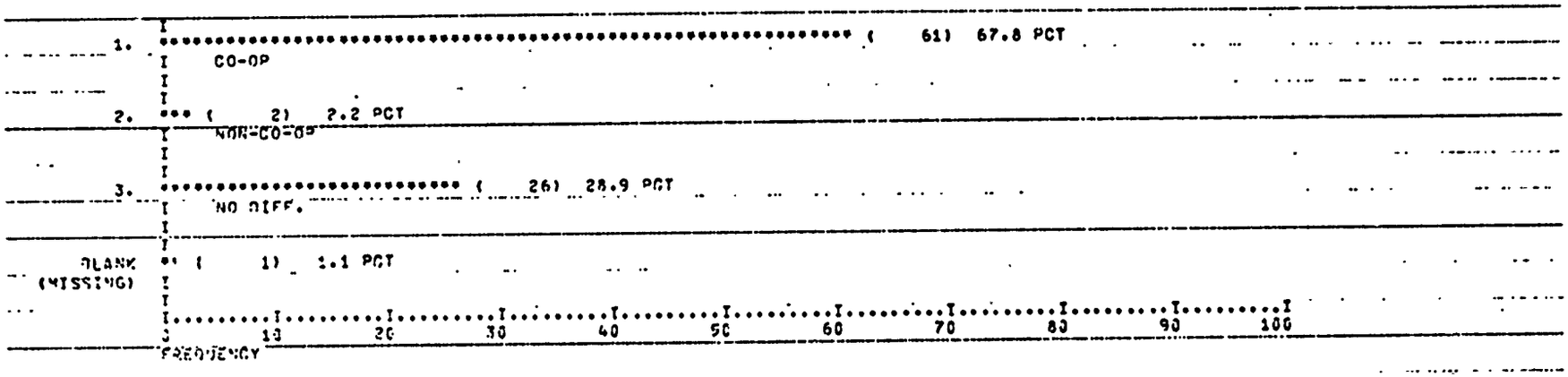

FIGURE B-4. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 4 -- THE COST OF INITIAL TRAINING IS LESS IN THE CASE OF...

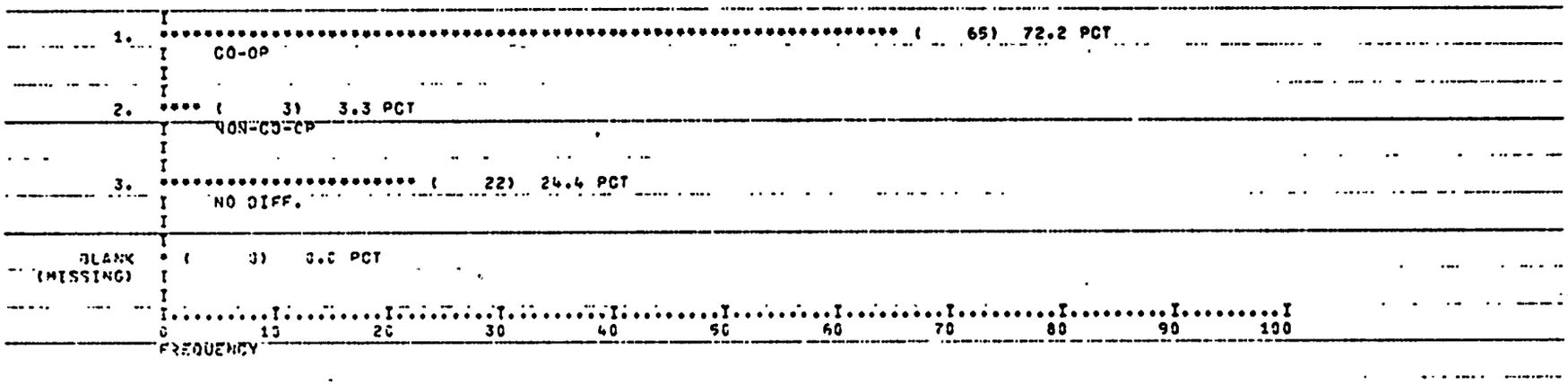

FIGURE B-5. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 5 -- THE OVERALL QUANTITY OF PRODUCTION OR SERVICE IS GREATER IN THE CASE OF...

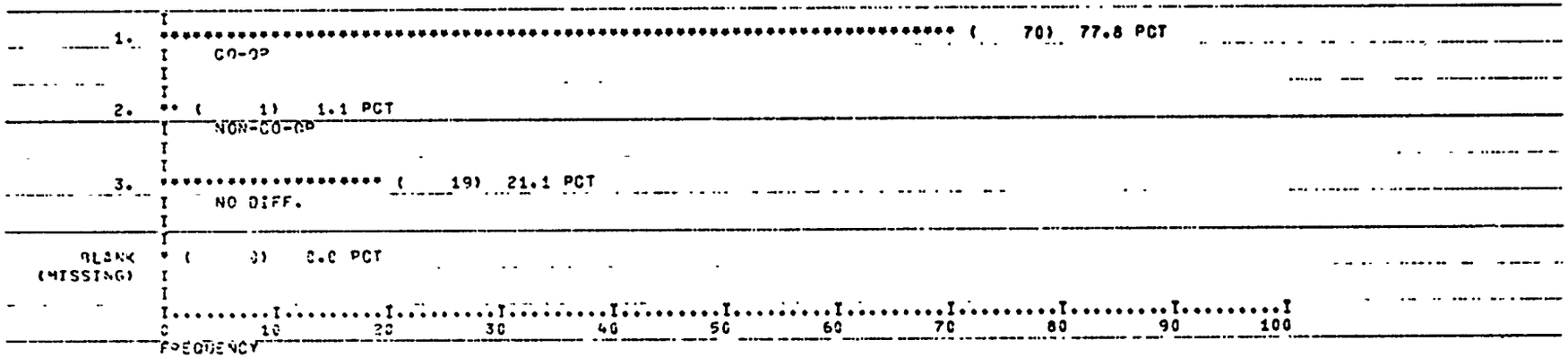

FIGURE B-6. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 6 -- THE OVERALL QUALITY OF WORK IS BETTER IN THE CASE OF...

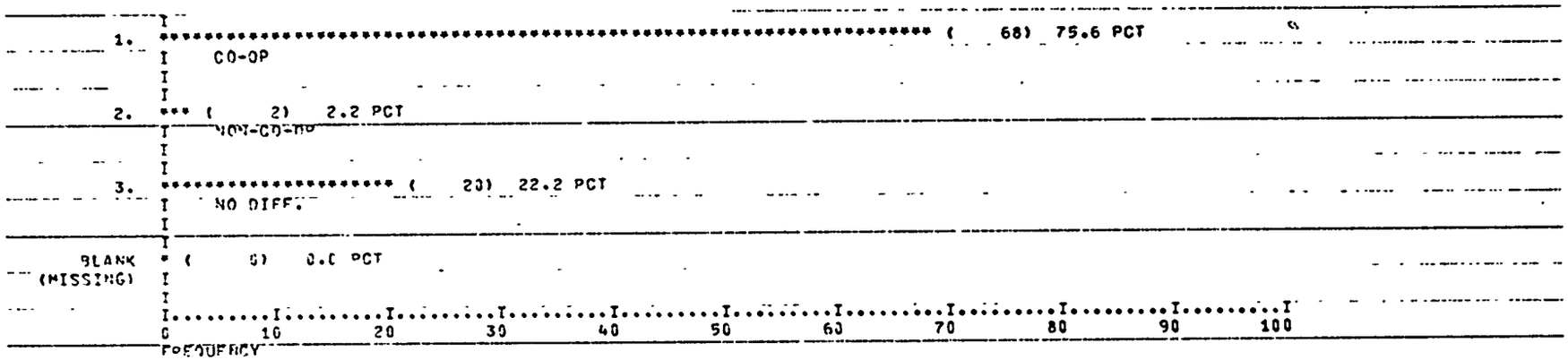

FIGURE B-7. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 7 -- THE MOTIVATIONAL CHARACTERISTICS ARE BETTER IN THE CASE OF...

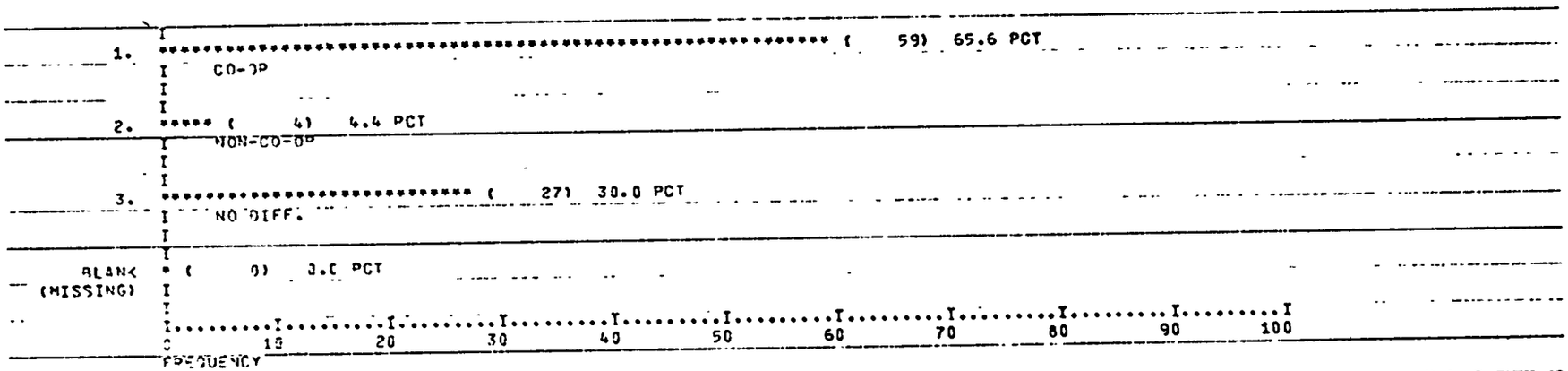

FIGURE B-8. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 8 -- THE WORK HABITS ARE BETTER IN THE CASE OF...

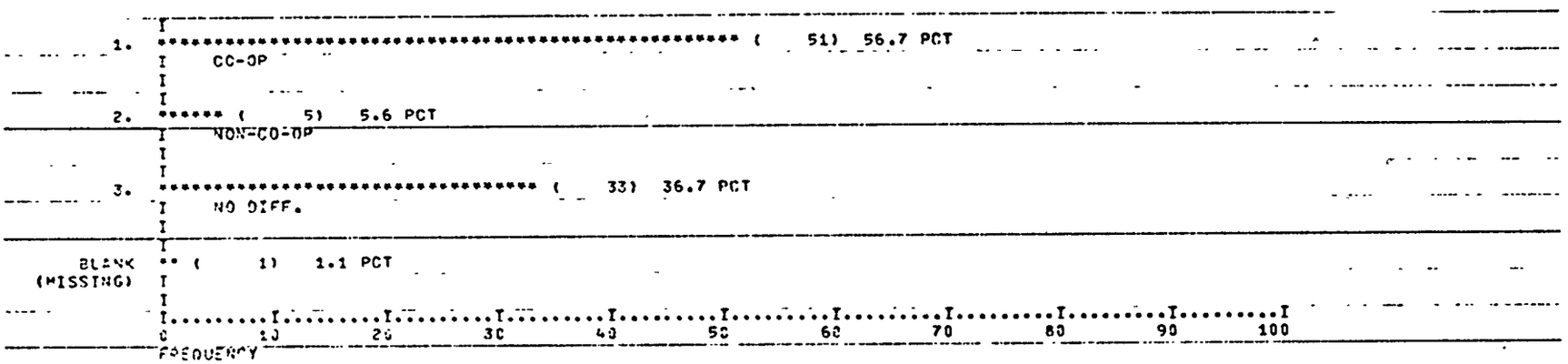

FIGURE B-9. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 9 -- THE MANIPULATIVE SKILLS ARE BETTER IN THE CASE OF...

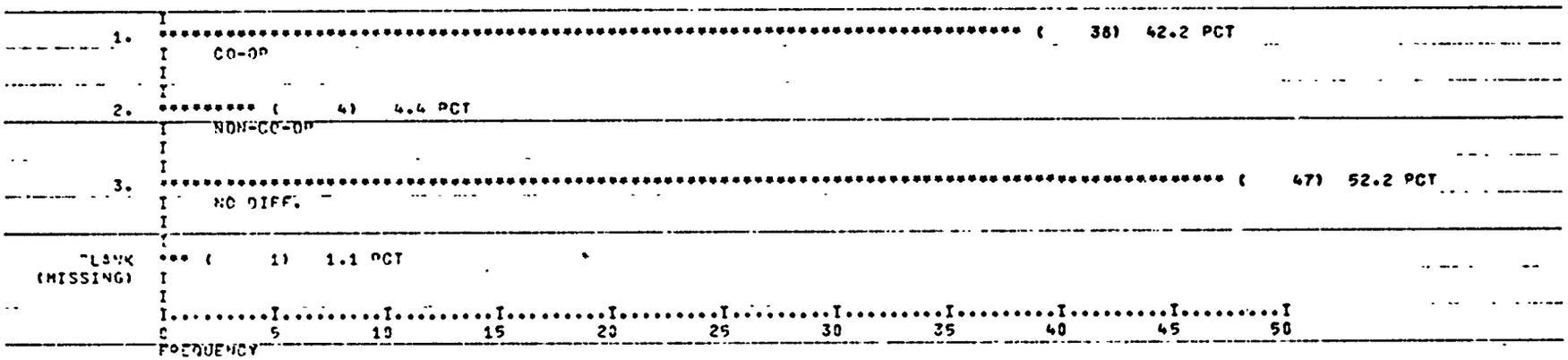

FIGURE B-10. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 10 -- THE HUMAN RELATIONS SKILLS ARE BETTER IN THE CASE OF ...

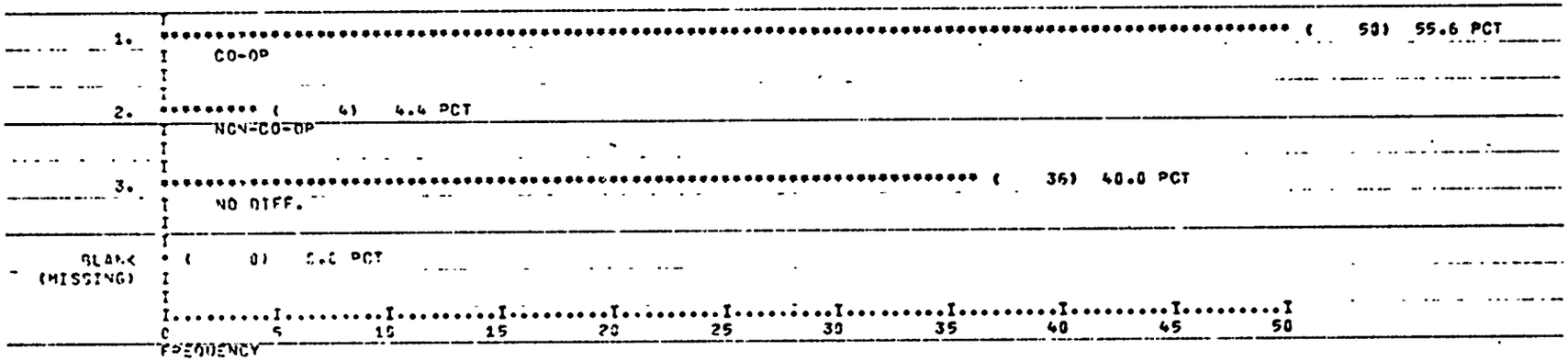

FIGURE B-11. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 11 -- THE CONCEPTUAL SKILLS ARE BETTER IN THE CASE OF ...

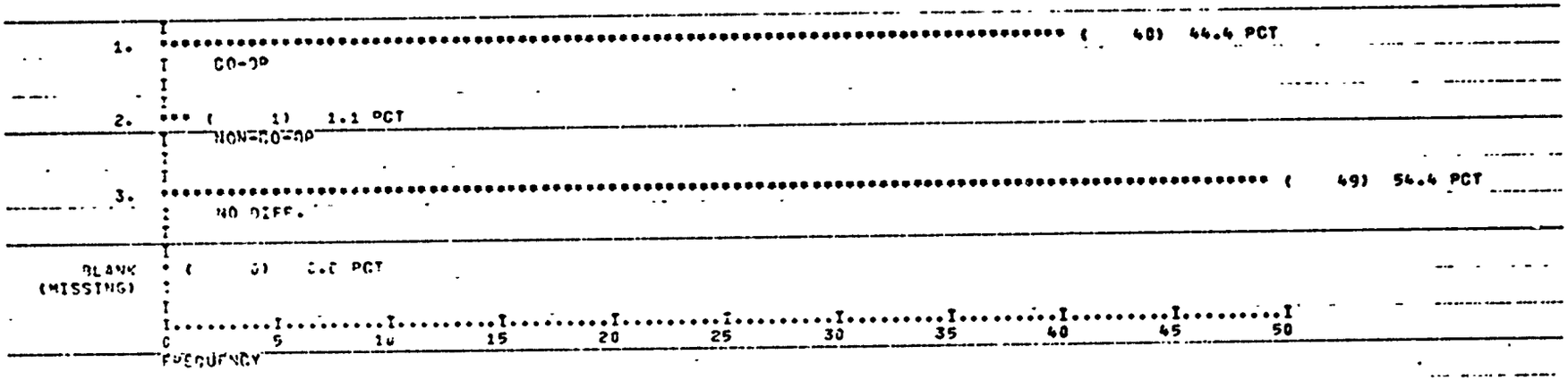

FIGURE B-12. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 12 -- THE AVERAGE ABSENTEE RATE IS LESS IN THE CASE OF...

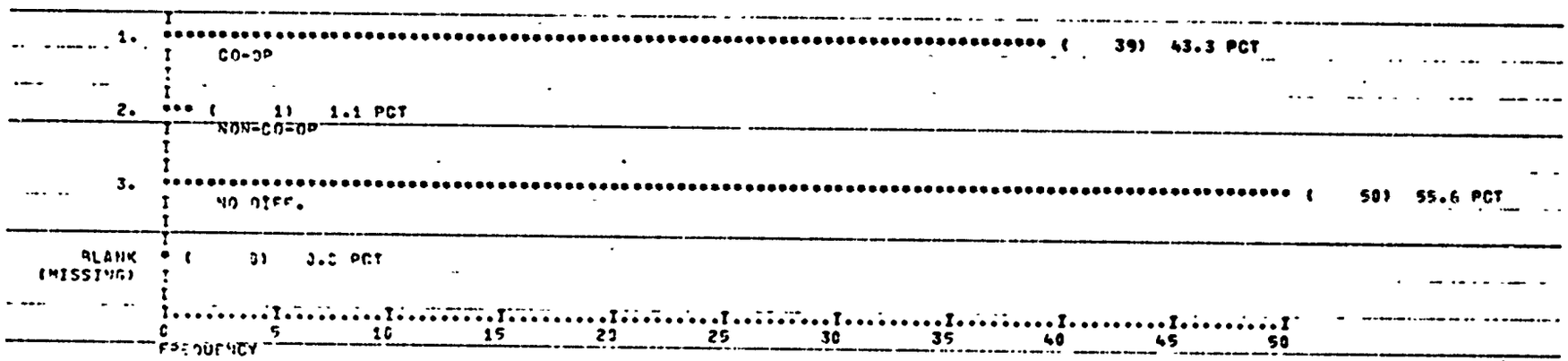

FIGURE B-13. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 13 -- THE AVERAGE PROPORTION OF DISMISSALS IS LESS IN THE CASE OF ...

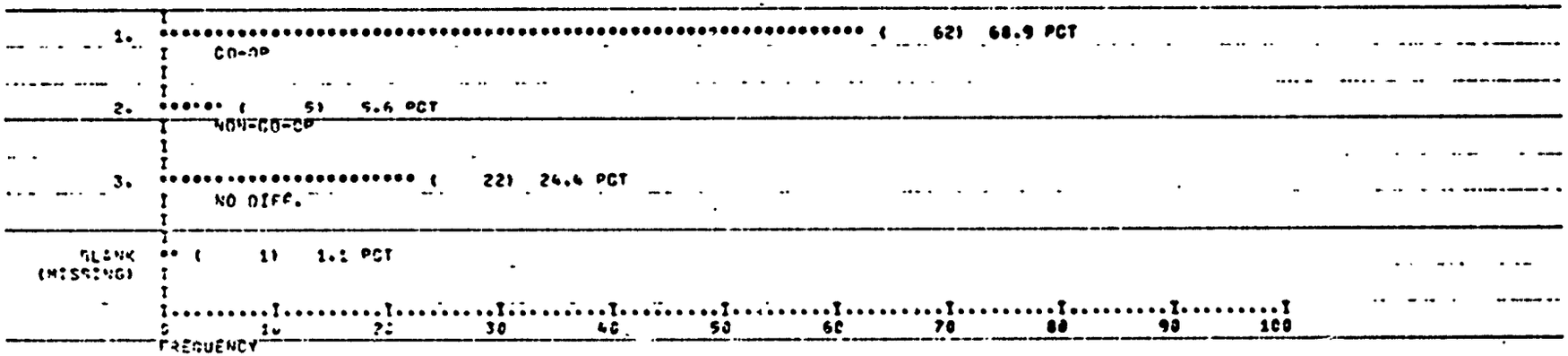

FIGURE B-14. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 14 -- THE OVERALL QUANTITY OF PRODUCTION OR SERVICE INCREASES MORE RAPIDLY IN THE CASE OF ...

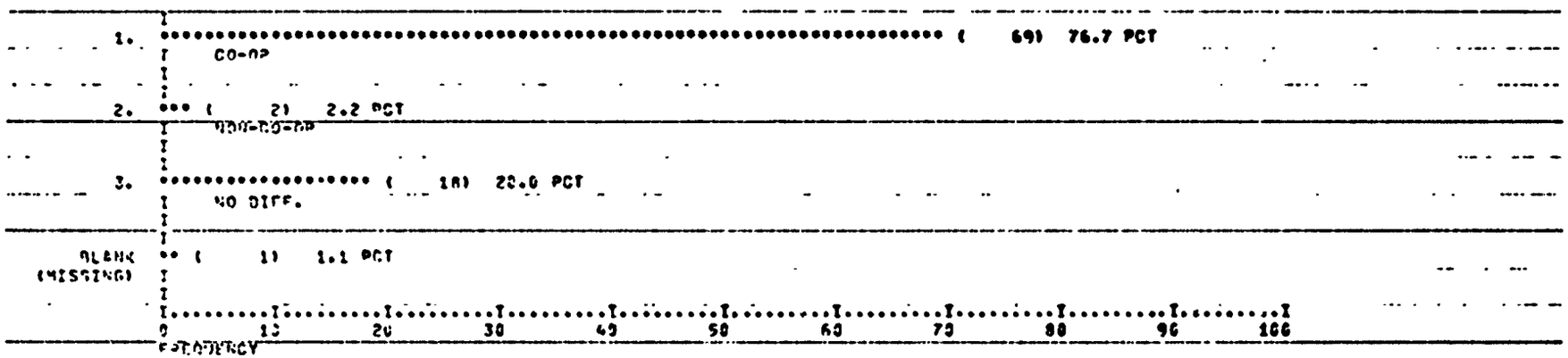

FIGURE B-15. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 15 -- THE OVERALL QUALITY OF WORK INCREASES MORE RAPIDLY IN THE CASE OF ...

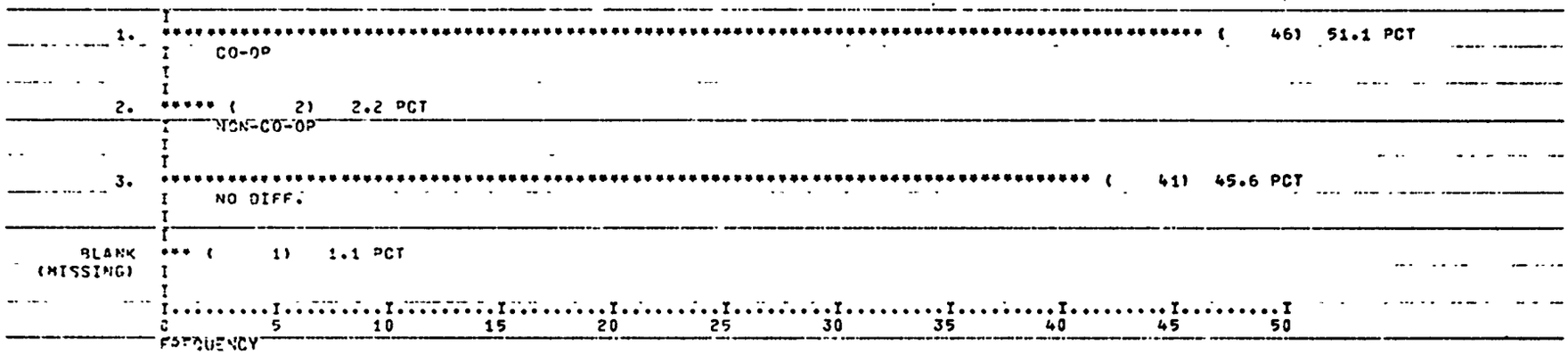

FIGURE B-16. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 16 -- THE AVERAGE WAGE INCREASES MORE RAPIDLY IN THE CASE OF ...

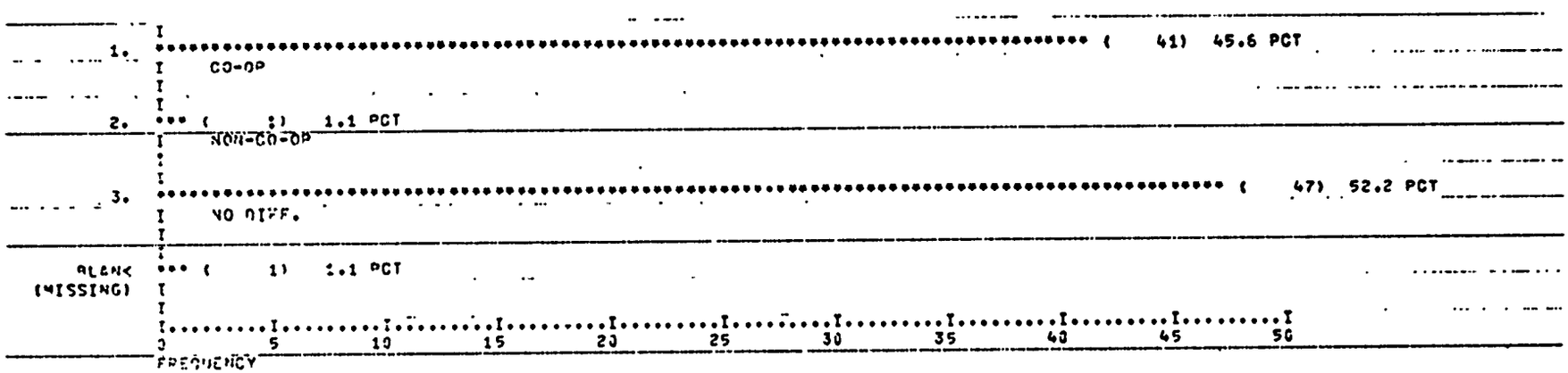

FIGURE B-17. EMPLOYER QUESTIONNAIRE RESULTS, ITEM 17 -- THE AVERAGE PROPORTION OF DISMISSALS IS LESS IN THE CASE OF ...

APPENDIX C

RECOMMENDATIONS FOR IMPROVING THE DATA COLLECTION INSTRUMENTS AND PROCEDURES

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RECOMMENDATIONS FOR IMPROVING THE DATA COLLECTION INSTRUMENTS AND PROCEDURES

The intent of this discussion is to offer suggestions for improving the data collection instruments and the data collection process for further in-depth studies. If such studies are undertaken, these suggestions will result in a more complete data base with less missing data, and with less uncertainty concerning some of the data items. Each of the data collection instruments are discussed below. Following this some general comments are presented along with our suggestions for improvement of the data collection procedures.

Data Collection Instruments

FORM A. School Building Cost Data

FORM A was designed to collect basic data on the costs of the buildings which the schools occupy so that a proportional cost of building space used by the vocational programs can be estimated.

Since the buildings and their additions or remodeling range in age from very new buildings to rather old buildings, cost data was collected in terms of the year in which construction or remodeling took place. The only difficulty encountered in this respect for the present study was that in some cases data were reported for very recent additions or remodelings which did not exist at the time of instruction for the students being studied. That is, the present study focused on the 1969-70 junior classes and 1970-71 senior classes of vocational students. However, in a few isolated cases, schools reported additions and remodeling expenditures incurred in 1972 and projected for 1973. These expenditures were excluded in the present analysis since they were subsequent to the time period being studied. In the future, it may be advisable to include in the instructions a request to report only those expenditures incurred to provide the building space available for the schools years being studied so that this confusion can be avoided.

One of the schools had difficulty reporting the actual square footage of building space. In this case, they were advised to estimate the square footage based upon their best estimates of building cost per square foot.

No other difficulties were encountered with FORM A. In fact, this form was very successful in that all schools were readily able to provide the data. This is certainly due in part to the simplicity of the form.

FORM B. Individual School Enrollment Data

FORM B was intended to provide descriptive data on the enrollment of the schools studied. Very little difficulty was encountered by schools in reporting these data. All schools were able to report the total junior and senior year enrollment. Only one school was unable to report the breakout of these enrollments with respect to types of instruction. A few schools had difficulty in providing student dropout data, and did not do so. A few schools also did not report racial mix of the students. We do not know the reasons for these difficulties but they were minimal in number, and it appears that the form can be used successfully in the future without modification.

FORM C. Vocational Program Cost Data

FORM C provided cost data for estimating direct instructional costs and laboratory equipment costs for the study. No difficulty was encountered with item 1, vocational instructional personnel. However, no programs reported data on teachers' aides; evidently there were none employed for the programs studied. Item 2, personnel fringe benefits, was bothersome. Several schools did not report data on this item and it was necessary to follow-up these schools to collect these data. Even then, in a few cases, the data reported seemed unrealistically low. It did not appear that the estimate covered all of the cost items indicated in the definition of personnel benefits. For example, in some cases the benefits were listed as $160 in comparison with a salary of $10,000. In

these cases, the estimate was changed to a more realistic estimate by applying an average percentage to salaries based upon the majority of data reported by other schools. For future studies, it may be more effective to ask that the personnel fringe benefits be reported as a percentage to be applied to salaries rather than allowing the option to present it either way.

No difficulties were encountered with items 3 and 4 dealing with transportation and consumable supplies.

Items 5, 6, and 7, dealing with laboratory equipment, usually were completed with little difficulty. A few schools confused rental equipment with purchased equipment and reported duplicate costs. These were clarified through telephone follow-up with the schools. In order to avoid this situation in the future, a note should be added to the instructions emphasizing that costs for particular equipment should not appear in both items 6 and 7, but rather only in one or the other.

Some difficulty occurred with items 8 and 9, dealing with floor space used by the program. Some data reported seemed confused with the dichotomy of floor space used solely by the program, and floor space shared with other programs. Perhaps if this question were expanded, the confusion might be lessened. For example, the questions may better be phrased as follows:

8. Is there any laboratory area used solely by the program? ☐ Yes ☐ No
   If yes, what is the approximate square footage of this area? _____ Sq. Ft.

9. Is there any building space which this program shares with other programs? ☐ Yes ☐ No
   If yes, what is the approximate square footage of this shared area? _____ Sq. Ft.
   What percentage of time is the shared area used by this program? _____ %
   What percentage of time is this shared area used by other programs? _____ %
   What percentage of time is this shared area not used and vacant? _____%
   (These three percentages should total 100%.)

FORM D. Vocational Program Descriptive and Effectiveness Data

. Originally FORM D provided for the collection of descriptive data on programs and effectiveness data through a follow-up of graduates of the program. The latter part of the form on the follow-up of graduates has been separated from FORM D and identified as FORM E in this report. For purposes of this report, it is being presented as a separate form, so that the portion of FORM D discussed herein is concerned with descriptive data only. The first recommendation then is that FORM D be retitled as "Vocational Program Descriptive Data".

Item 1 of this form was used to collect data on junior and senior year enrollment for the program. One difficulty with this item is that some programs had no junior year component. Also, one program was a junior year program and had no senior year component. It would simplify later data analysis if this condition were identified and specifically recorded. Thus, it is recommended that item 1 be expanded to include a question which explicitly asks whether or not the program has only a junior year component, only a senior year component, or both. For the present study, when no data were provided on junior year enrollment, it was assumed that there was no junior year component to the program. This happened for 24 of the 83 programs studied. No attempt was made to follow-up on this question, although in the future, the inclusion of the above recommendation would in most cases negate the need for such follow-up

For item 2, the schedule for 11th grade students, some confusion arose regarding the distinction between co-op and non-co-op programs. It appears that some senior year co-op programs have a junior year component that is non-co-op. In some of these cases, the respondents were uncertain where to report their data, either under sub-items a, b, and c, or sub-items e, f, and g. To alleviate this problem, it is recommended that item 2 be rephrased, so that sub-items e, f, and g, which are similar to sub-items a, b, and c, would be removed, and a, b, and c would be completed for both types of programs. The remaining sub-items d, h, i, and j would remain as further data to be reported only for co-op programs.

The same simplification would be made for item 3 of FORM D, the schedule for 12th grade students.

Very little difficulty was encountered with item 4 of FORM D. In a few cases, the schools were not able to provide all the descriptive data for an occupational advisory committee. No changes are recommended for this item.

Some recommendations can be offered for improving item 5 of FORM D, dealing with program prerequisites. First, it is recommended that sub-item (a) be changed from an open-ended question to a checklist format. From the types of responses received on this exploratory study, such a checklist could be generated. Included in this list might be the following prerequisite items:

- ☐ Age
- ☐ Class Rank
- ☐ Approval of parents, counselor and/or instructor
- ☐ Completed all sophomore or junior academic prerequisites
  - ☐ English
  - ☐ Mathematics
  - ☐ Science
- ☐ Completed all sophomore or junior pre-vocational prerequisites
  - ☐ Industrial Arts
  - ☐ General Business
  - ☐ Office Occupations (Typing, Shorthand, and/or Bookkeeping)
  - ☐ Business, Sales, Merchandising, and/or Marketing
  - ☐ Metals
  - ☐ Automotive Industries
  - ☐ Electronics

Sub-item (b) of item 5 is straightforward and no difficulty was encountered with it.

For sub-item (c) of item 5, only three programs indicated an aptitude test prerequisite, out of the 83 programs studied. It is questionable whether this item should be retained. Furthermore, difficulties were encountered with collecting and analyzing aptitude scores from FORM E, and these difficulties would also be present for this item. The difficulties arise because of the many variations of tests employed, making it impractical to generate a common measure across programs. If sub-item (c) is retained, it appears that the only useful information is the first question; the minimum score on the aptitude test should be deleted.

Sub-item (d) of item 5 on FORM D is straightforward and was completed in most cases without any difficulties.

FORM E. Vocational Program Descriptive and Effectiveness Data, Student Follow-Up Data

Referring back to the discussion on FORM D, the first recommendation is that this form be retitled "Vocational Program Effectiveness Data, Student Follow-Up". In discussing the data items on this form, the items will be identified by the column numbers on the form.

There were no difficulties with items 1 through 4 of FORM E, dealing with demographic data on sex, race, whether students graduated or not, and absence record. Some programs did not provide all of these data, but missing data were minimal.

Items 5 and 6 of FORM E resulted in data which were not easily processable in their present form. Several difficulties arose. First, the respondents did not distinguish between achievement tests and aptitude tests. The same test was often reported under both items. Secondly, too many different tests were reported, making it impractical to attempt to resolve them into some sort of common measure. Twenty-five to thirty tests were specified for the 83 programs studied. In some of these, the same tests were used, but different forms of scores were reported - raw scores, percentiles, percentages, and stanines. Consequently, as they presently exist, items 5 and 6 of FORM E could not be used in this study. For future studies, if data are still desired on this item, it is suggested that three or four of the most commonly used aptitude and achievement

tests be identified. These tests should also be selected on the basis that they can be interrelated, that is, a score for one test can be converted into an approximate score for another test. Furthermore, the form of the score requested should be clearly defined, i.e., raw score, stanine, percentile, or percentage. It would thus be possible to summarize this information and to relate it to other effectiveness data as an explanatory variable. There is some reason to believe that class rank is a better, simple indicator. Perhaps this could be used rather than test scores.

Items 7 through 19 of FORM E are a function of the follow-up period used by the respondent. The majority of the data were based upon a 13 to 18 month follow-up period but some programs did report data for the shorter follow-periods. It's difficult to summarize the data when there are three follow-up periods, and since the majority of data followed one of these three periods, it would be advisable to future studies to encourage the reporting of data based upon a common follow-up period.

Items 7 and 8 of FORM E could be improved to remove some ambiguity. In the present form, it was sometimes questionable whether or not respondents were reporting accurately the employment status of their graduates. If they reported one of the employment status classifications under item 7 there were no problems. However, for unemployed graduates they did not always provide the information required under item 8. Furthermore, a graduate may have been employed (which should have been indicated through the completion of items 10 through 19), but if data were not available for this graduate, his employment status was uncertain. (For the present study, a conservative approach was taken, and a graduate's employment status was considered missing data unless it could be determined with some degree of certainty from the data completed.) For future studies, it is recommended that items 7 and 8 be combined and expanded, so that for each graduate, his employment status would be indicated by checking one of several columns entitled currently unemployed, currently employed, currently unavailable for employment. The major title, NOT AVAILABLE FOR EMPLOYMENT, should be removed since post-secondary students could also be employed. For those graduates identified as currently

employed, items 7 (with the exception of "Entered Military Service"), could be completed and items 10 through 19 would offer further information on employment. Thus, the present ambiguity would be avoided.

Items 10 and 15, name of entry payroll title and highest skill level attained since graduation, were not amenable to summary for the present study. The reason is that once again, they are open-ended items (much like the items on aptitude and achievement tests), and the responses were so varied that it was impractical to attempt any synthesis. Our recommendation is that a substitute item be developed for these two items. Their purpose was to indicate rate of improvement in employment of the graduate. If the follow-up entails contacting the graduates, perhaps they can better respond to an item which qualitatively measures improvement through some categorization such as the following formulation:

Do you consider your employment since graduation in terms of advancement to be

- ☐ above normal
- ☐ normal or average
- ☐ below normal?

It would be necessary to collect information on whether or not the employment is related to the vocational training, and whether the graduate thinks his vocational training affected his advancement.

Items 10 and 16 of FORM E deal with most recent and entry wage rates, and together provide another indication of advancement in employment. The only difficulty with these items was the fact that the data were missing for some of the graduates. No recommended changes in the item are in order but possibly the respondents should be encouraged more strongly to provide these data by making them aware of its importance to the study.

No problems were encountered with items 11 and 13 of FORM E dealing with time to first employment and length of longest employment.

Item 12 of FORM E resulted in some ambiguity in the responses. The question asked for the number of different employers since graduation, with the intention that if a graduate was employed and did not change employers, his number of different employers would be one. Some programs reported this number as zero, emphasizing the term "different" in the question. To remove this ambiguity, the question should be phrased as "Total number of employers since graduation".

Item 14 of FORM E produced no difficulties for the analysis. The reasons listed for this open-ended question were consistent and limited to those listed in the Effectiveness Analysis section of this report. Possibly from this list, a check list of reasons could be incorporated into the instrument to avoid the open-ended format and facilitate summary of the data.

Items 18 and 19, dealing with location of employment, both initial and most recent, involved little difficulty in analysis. The only difficulty was that in some cases both items were not completed. In reviewing these cases, it seemed apparent in some that the reason both items were not completed was that the response was identical. (However, for the present study, no inferences were made for these missing data. They were treated as missing.) The instructions to this instrument should emphasize that both items should be completed if the data are available.

Item 17 of FORM E was completed with no difficulty, except for that portion of responses which was missing. One could hypothesize that these missing data were in fact negative responses, since the question is such that respondents may only indicate exceptions "yes" responses), but without following up these missing cases, it would be difficult to determine if this hypothesis is true.

Items 20 and 21 of FORM E were not successful for the same reasons given for items 9 and 15. The responses were too varied for synthesis and also the response rate was poor. Since the purpose of these items was to determine if the graduate's employment was related to his vocational instruction, a differently phrased item should be substituted which collects this information directly, such as the following:

How is the graduate's present employment related
to his co-operative vocational training?

- ☐ not at all
- ☐ slightly
- ☐ directly.

Items 22 and 23 of FORM E did not present any difficulty for the analysis and no further recommendations for change are offered.

FORM F. Questionnaire for Employers of High School Graduates of Vocational Education Programs

This instrument worked very well. We experienced very little difficulty with it and do not suggest any changes, should it be used in a future study.

Data Collection Procedures

For future studies, in addition to visiting the schools to discuss the data collection instruments prior to the start of data collection, as was done for the present exploratory study, we strongly recommend that each school be visited after the instruments have been completed. At this time all completed forms should be reviewed in detail, and questions should be raised concerning missing data and ambiguous responses. Furthermore, wherever data are missing, instructions should be provided to denote these data as missing to distinguish them from data items which are not applicable in a particular case. These procedures should result in a much more reliable data base for analysis purposes. When planning such future studies, this follow-up review of the data should be planned and budgeted for and its importance should not be minimized, as it will have direct bearing on the quality of the analysis. If the procedures described earlier are used as a basis for planning such a study, coupled with the recommendations offered for improving the instruments and the recommendations for a follow-up review, the study should result in a sound approach to the evaluation of the various types of vocational programs available today.